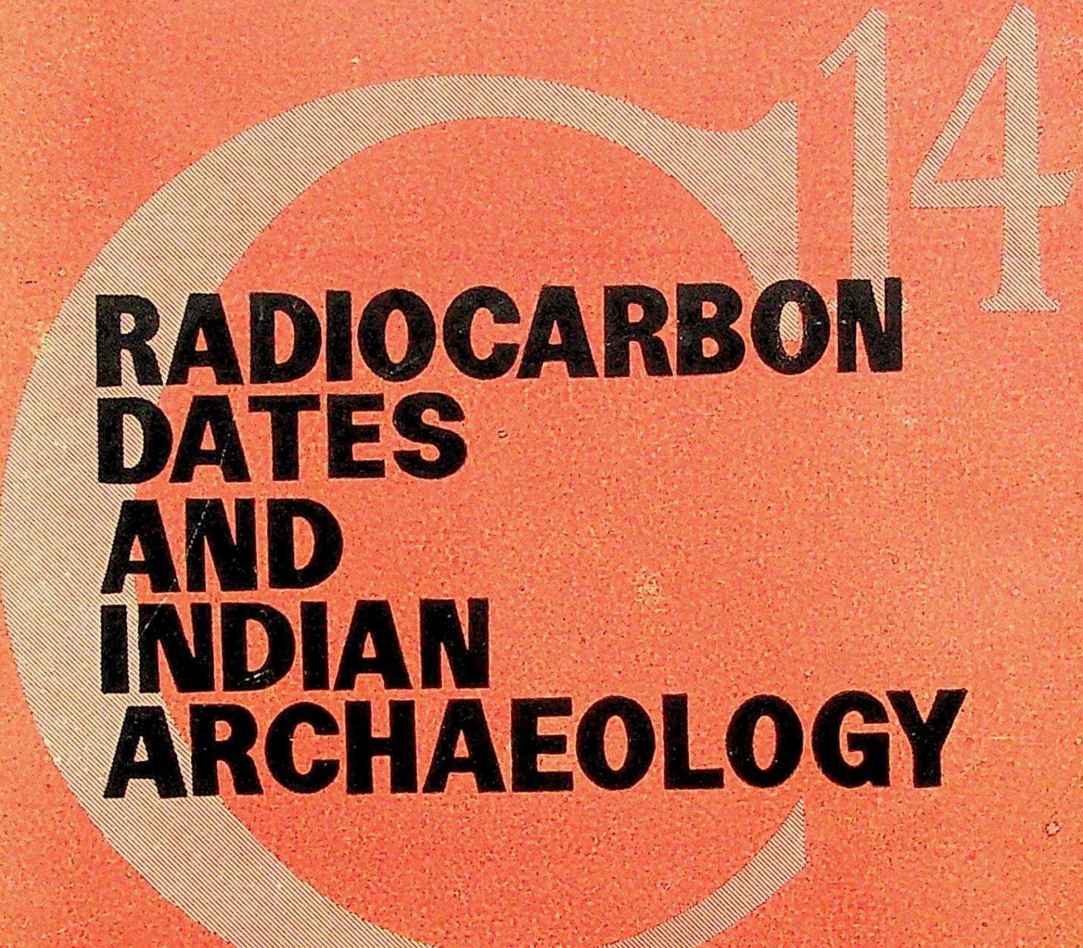
D. MANDAL



RADIOCARBON DATES AND INDIAN ARCHAEOLOGY

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AND
INDIAN ARCHAEOLOGY

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AND
INDIAN ARCHAEOLOGY

BY

D. MANDAL

INSTITUTE OF ARCHAEOLOGY
ALLAHABAD UNIVERSITY

Foreword

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Vaishali Publishing House

ALLAHABAD

NOVEMBER 1972

4387

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State Museum Library, Lucknow

PRICE
Rs. 40.00; £ 2.10s
$ 6

PUBLISHED BY SMT. BASANTI BOSE FOR THE VAISHALI
PUBLISHING HOUSE—207 SOBATIABAG, FORT ROAD,
ALLAHABAD-2
&
PRINTED AT THE DOMINION PRESS, ALLAHABAD

To
My Friends and Colleagues

FOREWORD

Chronological framework is the very backbone of archaeology and a reliable method of dating is the most important tool for the archaeologist. In its infancy, for obvious reasons, Indian archaeology depended exclusively on typological analysis and comparison till the technique of stratification came to be introduced. Marshall and Wheeler represent the two important milestones in the progressive development of Indian archaeology. However, it was only after the facilities of C^{14} measurements were made available, especially by the Tata Institute of Fundamental Research, Bombay, that we could really claim to have at our command a truly scientific method of dating. But the application of radiocarbon dating needs careful consideration of a great many factors and elimination of a number of pitfalls. The importance of a work on the application of C^{14} dating in the context of Indian archaeology can, thus, hardly be overemphasized. It is a matter of pride and gratification for me that a pioneering work in this direction should have been undertaken by my pupil, Sri D. Mandal, now a member of the staff of our Institute.

Sri Mandal has brought to bear on his present work years of experience in field work, an intimate knowledge of the various aspects of Indian archaeology, and an acute sense of observation and analysis. In his attempt to formulate a methodology of the application of C^{14} dates and in the conclusions he arrives at through a critical analysis of the relevant data of Indian archaeology, I am sure scholars will find stimulating food for thought.

University of Allahabad, G. R. Sharma

Allahabad
November, 1972

PREFACE

The present work attempts to study the relationship of the C^{14} dates with the corresponding stratigraphic profile and seeks to investigate the bearing of the result on the problem of evaluating the chronologies of the various culture-complexes of Indian archaeology. It is of course a revaluation of the archaeological chronology in the light of radiocarbon dates, but not simply on their face value : only the stratigraphically valid dates have been considered.

The nature of the problem, naturally, involves many basic questions pertaining to the application of C^{14} dates in ascertaining the sequence of archaeological events of which some are as follows : Should all C^{14} dates not found *prima facie* contaminated be treated valid ? Should such dates as are free from recent contamination but found to be inconsistent be considered dependable and be used in determining chronology ? Should an isolated date for the intervening strata of a multi-culture site be taken as reliable guide ? Are the dates for the intervening strata competent to decide the initial and the terminal limits of a particular culture or its phase ? The present work also endeavours to find out some probable criteria for judging the validity of C^{14} dates in the archaeological context and scrutinizes the available dates for the following cultures--Neolithic, pre Harappa, Harappa other Chalcolithic, Megalithic, Painted Grey Ware, and Northern Black Polished Ware. Lastly, it also tries to build up their chronologies on the basis of the valid dates.

Radiocarbon method, being the most scientific of all the dating devices in practice, undoubtedly has to play an important role as link between the absolute and the relative dating methods. As such, special attention is needed to improve the lacunae, both in the methodology, and particularly in its application. The present study of more than two hundred C^{14} dates in relation to the corresponding stratigraphic sequence thus gives a note of precaution against the developing trend to emphasize the C^{14} dates just on their face values.

Some unavoidable circumstances caused delay in the publication of the present work. Meanwhile there was accumulation of several new data, both the C^{14} as well as the archaeological. which, however, I have tried my best to accomodate here as far as possible. It now contains most of the relevant data at our disposal till the middle of 1972.

For this work I am indebted to my teachers, friends, collegues and libraries in various ways.

To my revered teacher Professor G. R. Sharma, Head of the Department of Ancient History Culture & Archaeology and Director Institute of Archaeology, Allahabad University, who initiated me into field archaeology and under whose supervision I have had the privilege to excavate and explore a number of sites; I cannot express in words my deep sense of gratitude. I am equally grateful to my other teachers in the department, especially Professor J. S. Negi, Dr. B. N. S. Yadava, Dr. U. N. Roy, and Dr. S. N. Roy for their affectionate co-operation.

I am highly thankful to my beloved friends Dr. D. P. Agrawal of the Tata Institute of Fundamental Research, Bombay, Dr. S. C. Bhattacharya, Dr. R. K. Varma, Sri V. D. Misra, Sri R. K. Dwivedi, Sri B. B. Misra of the Department of Ancient History Culture & Archaeology, Allahabad University, and Sri N. K. Ghosh of the Archaeological Survey of India, New Delhi, who helped me in many ways. Dr. Agrawal deserves special thanks for extending all possible co-operation at the formative stage of this work in spite of his busy engagements.

I warmly acknowledge the timely response of Dr. G. F. Dales of the University of Pennsylvania to some of my queries regarding his excavation at Mohenjodaro, and express my heartiest regards to Dr. Vishnu Mitre of the Birbal Sahini Institute, Lucknow, and Dr. V. N. Misra of the University of Poona for some valuable discussions and suggestions.

Thanks are also due to Sri H. N. Kar, Sri L. P. Tiwari and Sri S. Thakur for drawing the map and chart, and to the manager of the Dominion Press, Allahabad who provided me a homely atmosphere in his press.

I avail myself of the opportunity to express my gratitude once again to Dr. B. N. S. Yadava, Dr. R. K. Varma and Sri V. D. Misra for their help at all the stages of this book.

I am deeply indebted to my sister Rama for her co-operation in the publication work, to my elder brother Sri J. P. Mandal for his blessings and encouragement, and to my old friend Sri R. C. Tripathi, I.A.S., a former teacher of the Department of Ancient History Culture & Archaeology, Allahabad University, for his keen interest in my research.

Lastly, I am also thankful to my wife Basanti for her valuable discussion on some of the relevant problems related to science.

In spite of my best efforts some printing errors have crept in owing to unavoidable circumstances for which I crave the indulgence of the readers.

November, 1972 **D. Mandal**

Institute of Archaeology,
Allahabad University.

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AGE	LINE	PRINTED	READ
6	6	importont	important
7	12	with an asterisk	with an asterisk in the Consolidated List of C-14 Dates (Chap. VIII).
14	15	Egypt^{1}ans	Egyptians
36	22	Nagrajrao	Nagarajarao
60	Side heading	Damb Sddt	Damb Sadaat
81	(footnote)	See post script B	See post script
85	35	Rao (AI, 18-19)	Rao (1962-63)
87	18	1960	1960, 68
109	9	Nagaraja Reo	Nagarajarao
109	18	Neolthic	Neolithic
109	24	ot	to
110	14	perists	persists
127	10	Malw	Malwa
127	37	recifedt	rectified
143	20	inwant	in want
163	17	270±106	270±105
166	28	Misra (1970, 14)	Misra (1970a, 14)

CHAPTER I

INTRODUCTION

The facility of radiocarbon dating is a recent development in India. It was in 1961 that the Tata Institute of Fundamental Research, Bombay, launched a C^{14} dating programme. Within a very short span of time the Institute has provided a fairly large number of dates for various culture-complexes of Indian archaeology. These dates have substantially paved the way for determining absolute chronologies of various cultures. However, they now require a careful application in ascertaining the sequence of archaeological events. In the present work an attempt has been made in this direction.

The main objective of this work is to study the validity of radiocarbon dates in relation to stratigraphy, which is one of the fundamentals of scientific archaeological investigations. Before initiating our problem in detail, it must be mentioned clearly at the outset that the term 'validity of radiocarbon date' is not used to mean the validity of radiocarbon principles or the inherent limitations involved therein. The term here is used solely in the context of stratification. It does not matter much if the obtained C^{14} dates do not consistently agree with the archaeological estimates, but it becomes a matter for investigation if the radiocarbon dates do not correspond well to the principle of stratification. The emphasis on the relative study of the two, C^{14} dates and stratigraphy, is necessary particularly for the dates in tropical countries as the problem of stratification in the tropics is different from that of the countries of temparate and other zones. The bleaching influences of an Asiatic sun produce lots of practical difficulties in the working of stratigraphy (Wheeler, 1947, 147).

The difficulties are also caused by the peculiar nature of the formation of layers in the tropics. These create hinderances in the 'collection of error-free carbon samples'. The collection of 'error-free' carbon sample is thus an important problem. In this connexion Clark observes that "of more fundamental importance is the continued effort to recognize and remedy sources of error and contamination in the collection and preparation of samples....a watch has to be kept on possible ways in which the age may be exaggerated, whether by the inclusion of older charcoal derived from earlier periods of occupation or through the introduction of inactive charcoal (Clark, 1960, 161-62)" The chances of contamination in our climate are greater than in that of non-tropical countries where the formations of layers are comparatively compact and distinct and one may depend even on a few dates for building a chronology of a particular site. But for tropical countries it would not be wise. Consequently, an extra necessity to emphasize the consistency in radiocarbon dates, borne out by the stratigraphic sequence, is needed. One or two dates or only a few 'suitable' dates for a site, may not be very dependable for building any chronology.

Problems and Approach

In recent years, as said above, a large number of radiocarbon dates for various culture-complexes of Indian archaeology have become available. Sufficiently dependable C^{14} date-based chronologies have been built up for some of these culture-complexes, whereas for some others, on available maximum spread, only a general chronological framework could be suggested. For still a few others, the number of C^{14} dates available is very limited and isolated in nature. Some of such dates at the same time are also extremely controversial from the point of view of stratigraphical validity. These dates may or may not be valid, but what is significant to note in this connexion is that all C^{14} dates found to be free from recent contamination may not always be valid in archaeological context. And here germinates our problem : should all C^{14} dates not found *prima facie* contaminated be treated valid ?

If we start with the presumption that all are valid, a few significant questions immediately crop up which have to be answered. Why should such dates as are free from recent contamination but found to be inconsistent with stratigraphic sequence, be treated valid and used in determining an absolute date for a particular site ? Why should an isolated date of sample derived from the intervening strata of a multi-culture site be taken valid ?

In such cases where only an isolated date is available for a site, we may not be sure whether it is free from contamination which may have possibly occurred during the collection of samples. Sample suffering from recent contamination may easily be detected but when contamination is by the material of preceding or succeeding deposits it may not be worked out unless and until it is checked by the results of more samples derived from the same and/or the succeeding and preceding strata. Similarly the validity of dates for layers, having sizable gap represented by intervening undated strata, becomes questionable even though they are consistent in long range. For, in such cases also it is not possible to examine the validity of a date.

The present line of investigation demonstrating that all dates (not found *prima facie* contaminated) may not always be valid in archaeological context leads us to the second part of the problem. What should be the criteria to judge the archaeological validity of the obtained C^{14} dates not found *prima facie* contaminated ? Big task it is, indeed, calling for expert's examination to decide the matter. However, an humble attempt has been made here in this direction. The criteria followed in the present work are briefly enumerated below : —

(a) Only those dates have been considered ideally valid which are found fully or nearly consistent with stratigraphic sequence at the site. However, under certain circumstances, even if dates are apparently not fully consistent but become consistent within the range of 'counting error', they too have been treated valid.

(b) Though an isolated date (where only one date is available for a site) should not, on principle, be considered valid, the following factors have been taken into consideration in judging its validity. Whether it belongs to a single or a multi-culture site, and whether its sample derives from the basalmost or the subsequent strata ? If the date is for a single-culture site and its sample belongs to the basalmost stratum, it has been treated to some extent valid as there remains practically no chance of contamination by earlier material, though the possibility of contamination by later material still lingers. This criterion would at least save a site from being dated older than it deserves.

The problem of an isolated date obtained for a multi-culture site is slightly different. Here the possibilities of contamination from entirely different culture groups are involved. It, thus, requires a still stricter investigation. In view of this the status of a single date has been treated to be of 'neutral value' even if it belongs to the bottommost stratum of a particular culture not representing the earliest one. The date for a layer, other than the basal one, of either a single or a multi-culture site, has also been treated to be of 'neutral value'; for, its validity, in want of positive evidence, might not be questioned on face value, and at the same time the possibility of contamination by both earlier and later materials can not also be completely ruled out.

Within the framework of above criteria the details have been worked out hrough the following stages (the methods adopted herein are also briefly mentioned). The first stage of observation deals with the site-wise assessment of time-spread for the deposits in question. For its determination, first, each C^{14} date has been compared with its corresponding archaeological date, wherever available, in order to examine the relationship of the two. Secondly, with a view to judging the validity of results so derived the position of their internal consistency borne out by the stratigraphic sequence has been determined. Thirdly, an intercomparison of dates of various levels has been made in order to ascertain their relationship within the range of 'counting error' attached to them. But in assessing the archaeological event the use of standard deviation—always in a uniform manner—has been kept very restricted. Mostly the conclusions are based on central dates. Lastly, the 'mean' of dates which are found to be either of the 'same age group' or 'contemporary' or an age within a period which is much smaller than the 'error' on radiocarbon dates, has been obtained by applying the following relation (Agrawal, 1968b, 80) :—

$$T \pm dt = \frac{\Sigma\left[\left(\frac{A}{dA}\right)^2 + \left(\frac{B}{dB}\right)^2 + \ldots\right] \pm \Sigma\left[\left(\frac{A}{dA}\right)^2 + \left(\frac{B}{dB}\right)^2 + \ldots\right]^{\frac{1}{2}}}{\left[\frac{A}{(dA)^2} + \frac{B}{(dB)^2} + \ldots\right]}$$

The second stage determines the time-spread of a particular culture on the basis of combined valid dates of available dated sites. Besides, an attempt has also been made to indicate, wherever possible, the emerging archaeological phases on the evidence of C^{14} valid dates for diagnostic traits and industries of a particular culture.

In the third stage the results of time-spread deduced for individual sites of a particular culture-complex have been examined, wherever possible, in the light of their regional variations in order to bring to relief the radiocarbon determinations in relation to geographical orientation. The present enquiry thus relates also to the question whether C^{14} dates indicate any migratory or trade pattern, and whether they throw any light on the problem of the origin of a particular culture.

Besides the problems and their probable solutions, as indicated above, there still remain some importont allied questions which have to be taken into note while applying the radiocarbon dates to determining the terminal time-bracket of a culture. It is becoming a practice to assign a time-bracket to a particular culture even when some C^{14} dates become available for any intervening strata of its two terminal phases Archaeologically a ' phase ' does not denote a' single level '; it is in fact a term connoting a ' range ' comprising a series of levels. Generally every ' phase ' of a culture is composed of several layers each representing a separate time-limit. As such only the bottommost and the uppermost layers, and none else, can provide the ' lower terminal date ' and the ' upper terminal date ' respectively for the phase in question. Thus, any time-bracket formed on the basis of a date or dates belonging to any intervening layers would be nothing but erroneous. A serious consideration therefore is needed, particularly in determining a bracket where a shorter span of time is involved.

The next problem which has to be given due attention is connected with the use of dates calculated on varying half-life value of carbon-14. Currently two values, i.e. 5730±40 and 5568±30, are recognised. Inspite of the fact that the difference between the two is substantial, it is very often seen that the dates calculated on two different values are amalgamated while determining the chronology of a culture. It is not at all proper to use the dates based on two different values in the context of the same time-bracket. Incidentally, it may be pointed out that C^{14} dates are frequently quoted and important conclusions are drawn on their basis without referring to the half-life value used thererin, which sometimes creates confusions of serious nature.

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Half-life & Reference year

The internationally accepted half-life of carbon-14 is 5568±30 years value, originally used by Libby. However, the recent researches recognise 5730±40 years, a better working value (Godwin, 1962 ; Mann et al, 1961 ; Watt et al 1961 ; Olsson et al, 1962), which has consistently been used in the present work. For converting dates to A. D./B. C. scale, 1950 has been used as reference year.

Collection of Data

The majority of dates and associated data have been collected from primary sources. Only a few of them are from secondary sources which have been marked with an asterisk. The laboratories from which the dates have been incorporated in our work include :—

Tata Institute of Fundamental Research, Bombay, India ; University of Pennsylvania, U. S. A. ; University of Victoria, Australia ; British Museum, London ; Gif-sur-Yvette, France ; University of Washington, Seattle, U. S. A. ; and University of California, Los Angeles, U. S. A.

Lay-out

Our study takes into account various cultures of Indian Archaeology extending from Neolithic to Northern Black Polished Ware period. It comprises Neolithic, Harappa, Banas, Malwa, Jorwe, Eastern Chalcolithic, Megalithic, Painted Grey Ware and Northern Black Polished Ware* cultures. Besides, the pre-Harappa cultures have also been examined and discussed in detail in Appendix A. Barring pre-Harappa, the rest have been placed in the main text of the book and each of them forms a separate chapter. The chapters mostly open with a brief survey of the chronology of a particular culture based on evidence other than carbon-14. The archaeological chronology of a culture, forming part of the main discussion. has not been surveyed at the opening of the chapters in order to avoid duplication. The survey is followed by the main part of our study under the sub-heading *Date Scrutinized*. Each chapter ends with sub-heading *Findings*, which embodies conclusions and other observations.

---

*Henceforward the Painted Grey Ware and the Northern Black Polished Ware are referred to as P. G. Ware and N. B. P. Ware respectively.

A few words about the arrangement of chapters. The present work begins with Neolithic cultures which take priority over Harappa mainly because now they appear to be at least early contemporaries of Harappa culture. It is followed by Harappa, and other Chalcolithic cultures comprising Banas, Malwa, Jorwe, and Eastern Chalcolithic respectively. The fifth chapter deals with Megalithic culture. It finds place prior to P. G. and N. B. P. Ware cultures mainly in view of the discovery of the Northern Chalcolithic-Megalithic. Besides, a few dates for the Iron Age Megalith of south, placing it somewhere around 1st millennium B. C., also necessitate this line of treatment. The next two chapters include P. G. and N. B. P. Ware cultures respectively.

Abstract

The present work examines more than two hundred radiocarbon dates in the light of above-formulated principles, and on the basis of valid dates so derived tries to build up an absolute chronology for each culture-complex (extending from Neolithic to N B. P. Ware period). The lay-out of this work makes each chapter almost complete in itself. But interconnected as they are by the central theme, they at the same time constitute a unified whole. The emergent chronological framework based on valid C^{14} dates has been demonstrated in fig. 1.

Chapter II* deals with Neolithic cultures both of the North and the South. For the Northern group we have

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*Chapter I is Introduction.

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only one dated site, Burzahom. Archaeologically it is a unique Neolithic culture having no Indian parallels. However, it finds some cultural affinities with the Neolithic cultures of Northern China and Central Asia. On the basis of valid C^{14} dates it has been placed between c. 2400-1500 B. C. It seems to have co-existed with Harappa and also with other Chalcolithic cultures.

For the Southern group we have comparatively better data. In all there are ten dated sites. Archaeologically most of its settlements have either cultural affinities or have an evolutionary relation to each other. The C^{14} date-brackets vary at different sites. However, on the basis of the relationships of C^{14} date based time-bracket and cultural assemblage of corresponding archaeological phases the following chronological framework has emerged : –

'C^{14} based Phase I' is characterised by the assemblage of Utnur Phase IB to IIIA. It dates between c. 2300-2045 B. C. 'C^{14} based Phase IA' is characterised by the assemblage of T. Narsipur Phase I, Hallur Phase I and Sanganakallu's early level. It has been placed between c. 1800-1600 B. C. 'C^{14} based Phase II' is characterised by the assemblage of Tekkalakota Phase I and Hallur II. It extends from c. 1800 to 1000 B. C.

The Phase 'IA' is very important. It may be pointed out that all metal-free settlements, on archaeological ground, have been considered almost contemporaneous but the present analysis of C^{14} dates clearly demonstrates that they were not always so. They, infact, sometimes represent stages in a long survival of a particular culture. We find two clear streams in the Southern Neolithic Culture—the one representing the true Neolithic stream showing no knowledge of metal and surviving upto c. 1600 B. C., and the other appearing to have witnessed the use of metal (copper) as early as c. 1800 B. C., much earlier than the earliest date for the Jorwe-Malwa Culture, i.e.

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c. 1600 B. C. As the position stands they also seem to have co-existed with the Harappa culture. The C^{14} dates thus tend to push back to a considerable extent the antiquity of the Southern Neolithic Culture *vis-a-vis* that arrived at by archaeological interpretations. Lastly, they also provide hints for its indigenous origin. Our evidence does not support the hypothesis propounded by Allchin who looked for its origin in the region of North-eastern Iran.

Chapter III covers the Harappa culture, both the Central and the Peripheral. For want of direct C^{14} dates for the early levels, the chronology of the Central Harappa is still an unsettled issue. However, we have a few dates from Mohenjodaro representing its Late Phase. These dates have often been treated in lump and on that account a fairly early end of Harappa culture was postulated. But actually the available dates belong to different levels. Significantly enough their corresponding C^{14} dates are also not of the same value. Thus, if we consider *all* the available dates and provide them a level-wise treatment, its end can not be placed as early as has been pleaded.

The latitudinal plotting of dates of the Peripheral Harappa indicates that the Harappans moved from east to west in the Western Periphery, and from west to east in the Eastern one. The combined evidence of the two sectors makes, thus, a valid ground for treating the region of Central Harappa to be a mother-zone from where the Harappans might have moved in two directions. Naturally, the date of its Early Phase at its central region must be, if not earlier, at least coterminous with the available earliest date reading c. 2500 B. C. which is represented at Damb-Sadaat II. On this basis we have placed the beginning of Harappa culture at its central zone in about 2500 B. C. The date-bracket arrived at in the present work favours the retention of the chronology proposed by Wheeler.

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Chapter IV includes the other Chalcolithic cultures comprising Banas, Malwa, Jorwe, and Eastern Chalcolithic.

On C^{14} evidence the Banas culture (c. 2100 B. C.) was found to be the earliest among all the Chalcolithic cultures, barring Harappa. But it may be noted that it co-existed with both the Central as well as the Peripheral Harappans. It was almost an early contemporary of the Harappan of south-eastern Periphery dating at Lothal between c. 2200-1700 B. C. The Banasians have also been equated by some with the early Aryans. But if we equate the early Aryans with the Banasians who are alleged to have borrowed black-and-red ware from Lothal, we would have to postulate that the early Aryans were almost contemporaneous with the Peripheral Harappans, which probably was not the case.

Regarding Malwa culture our findings throw some interesting light on some major problems of Navdatoli, the key site of Malwa complex—the time-bracket and spread of the Chalcolithic horizon at the site, the relationship of the Chalcolithic (Period III) and the Early Historical deposits (Period IV), and the alleged western impact on it. The scrutinized C^{14} dates place the Malwa culture at the site between c. 1600-1400 B. C., providing a span of only 200 years. As far as the second of the above mentioned problems is concerned our evidence does not support the contention of the excavator and hints at a hiatus between Periods III and IV. It shows an abrupt end of the former much before the people of the Early Historical period inhabitated the site. Regarding western affinities of the Malwa culture our results suggest that it was possibly the Iranians who borrowed and not the Navdatolians.

The Jorwe culture dates between c. 1600-1200 B. C. but its date at different sites is not uniform. It gradually becomes younger on south-north axis.

It is almost contemporary of Malwa culture. Where the Jorwe Ware succeeds the Malwa Ware, it appears to be a case of late arrival rather than that of the late origin of the former. According to our findings, Jorwe culture seems to be an evolved phase of the Neolithic culture of the Southern Deccan.

For the Eastern Chalcolithic culture we have only two dated sites, Chirand and Mahisdal. The date-bracket determined for this culture is strictly proisivonal.

Chapter V deals with Megalithic cultures both of the South and the North. The confirmation of the existence of the Megalithic settlements in Northern India, along with further light on them, is a recent contribution to Indian archaeology. The results of Kakoria (Varanasi) are still more significant. It virtually gives a new dimension to our knowledge about Megalithic cultures in India, as it is of the Chalcolithic-Megalithic period. As regards the study of radiocarbon dating for this culture-complex, both Southern and Northern, it may be mentioned that it is still in its infancy since the available data are not sufficient. In majority of cases it was not possible to examine the position of their internal consistency. Most of the samples were either highly contaminated or were of neutral value. However, on the basis of the dates being tentatively valid, the Megaliths of Iron Age may provisionally be placed between c. 1000– 300 B. C.

Chapter VI studies the P. G. Ware culture. For this culture dates are available only for its Mid. and Late Phases. We have no date for its Early Phase from any of the sites except Atranjikhera which is of a neutral value. However, its lower limit which comes to c. 1st millennium B. C., has been worked out here on the basis of the extension limit and the obtained life-span for its Mid and Late Phases.

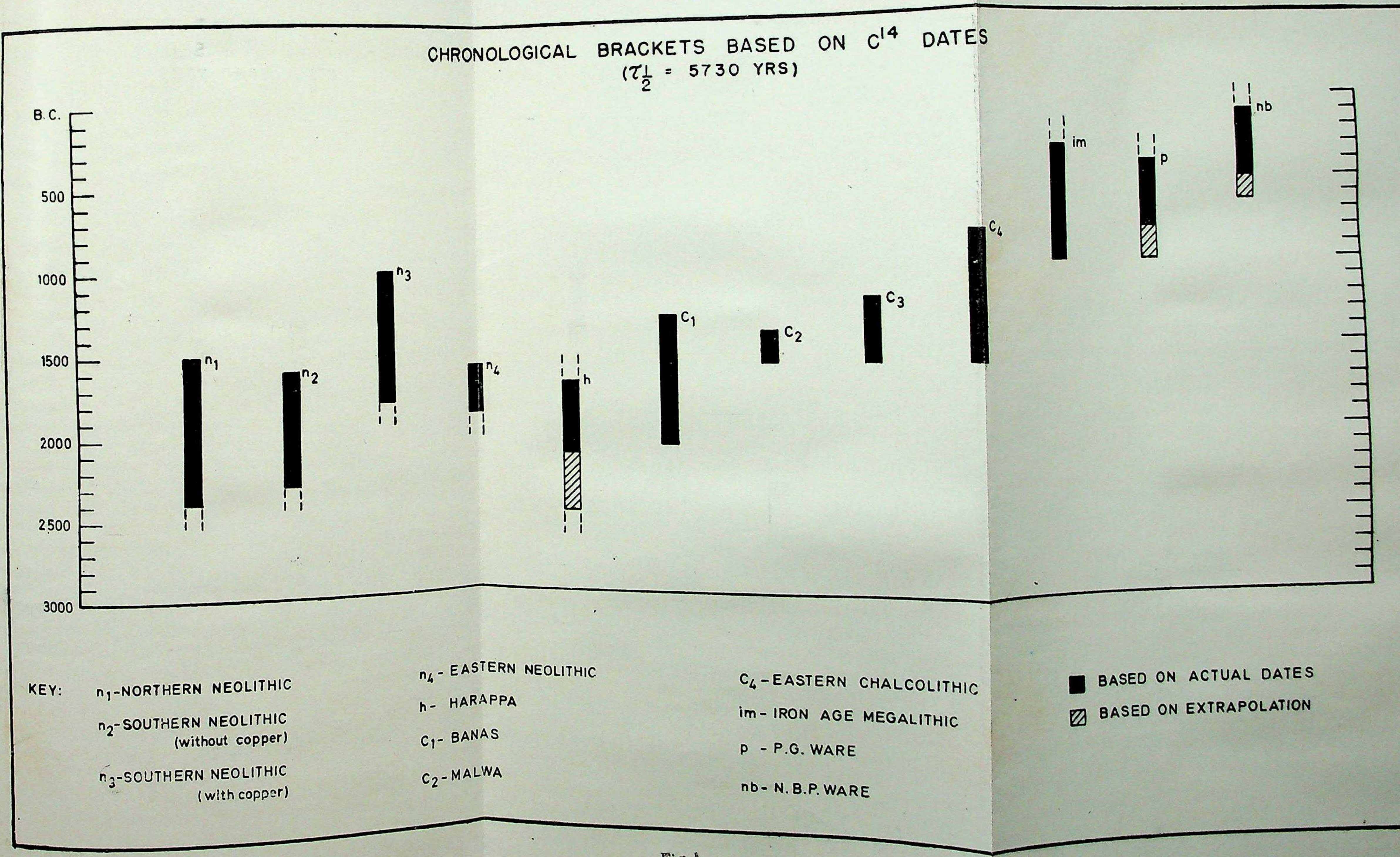
CHRONOLOGICAL BRACKETS BASED ON C^{14} DATES
($\tau\frac{1}{2}$ = 5730 YRS)
B.C.
500
1000
1500
2000
2500
3000
n_1
n_2
n_3
n_4
h
C_1
C_2
C_3
C_4
im
p
nb
KEY:
n_1-NORTHERN NEOLITHIC
n_2-SOUTHERN NEOLITHIC (without copper)
n_3-SOUTHERN NEOLITHIC (with copper)
n_4 - EASTERN NEOLITHIC
h - HARAPPA
C_1 - BANAS
C_2 - MALWA
C_4 - EASTERN CHALCOLITHIC
im - IRON AGE MEGALITHIC
p - P.G. WARE
nb - N.B.P. WARE
■ BASED ON ACTUAL DATES
▨ BASED ON EXTRAPOLATION

Fig.I

Chapter VII examines the dates of N. B. P. Ware culture. For this culture we have fairly good number of dates and dated sites. But, unfortunately, no other site except Kausambi provides ideally valid dates. The date-brackets vary at different sites. Under the circumstances, it is not proper to suggest any single time-limit for the entire region. It dates to 7th/6th century B. C. in the central, *circa* 4th century B. C. in the upper, and *circa* 3rd century B. C. in the eastern part of the central Ganga Valley. However, it may be placed between c. 650—100 B. C. The central Ganga Valley was probably the mother-region of this industry. Our findings also confirm the recent archaeological observations regarding overlapping position of the P. G. and N. B. P. wares. Besides, they also throw some light on the problem of the authorship and medium of spread of the N. B. P. Ware.

Chapter VIII, the last one, gives a consolidated list of radiocarbon dates in tabular form.

Appendix A deals with pre-Harappa cultures. Their C^{14} based date-brackets do not coincide on one point, as they differ from site to site. However, when plotted latitudinally they indicate a movement from Baluch-Indus region to west, on the one hand, and to east, on the other. The generally adopted method of hinging up the so-called floating chronology of the pre-Harappa cultures with Mundigak and other western sites, mainly on the ground of cultural equations, does not seem always tenable.

CHAPTER II

NEOLITHIC CULTURES

Until Wheeler (1947-48) confirmed the observations of M. H. Krishna* (1942) by the results of his excavations at Brahmagiri, the Indian Neolithic cultures were almost without any chronology and our knowledge about them was also extremely limited, confined as it was to the lithic industries discovered as surface-finds from various parts of the sub-continent. Of course, the collections, though impressive in bulk, were unfortunately without much value for cultural and chronological classifications. As such it is no wonder that sometimes they led to erroneous conclusions. As late as three years before Brahmagiri was excavated, it was the general feeling that "the neolithians of India were principally toolmakers and hence culturally inferior to the neolithic Egyptians who knew, in addition to toolmaking, agriculture, domestication of animals, manufacture of pottery, and textile industry" (Chakravarty, 1944,81-96). Surprisingly enough, even a couple of years after the above excavation was completed, the evidence of haphazard surface-collections led Worman to conclude that "in India there is no positive proof in regard to the existence of neolithic people at any time before or after the use of metal came into being." Howsoever deceptive and misleading the evidence of surface-collections might have been, it rendered undoubted help in understanding some of the distribution-pattern of Neolithic cultures even in that early stage. Aided by the knowledge obtained during recent years, the over-all picture of the horizontal-pattern has improved considerably.

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*He identified the Chalcolithic-Neolithic cultures as early as 1942.

On plotting the diagnostic lithic industries latitudinally, the Indian Neolithic cultures may typologically be divided into certain geographical provinces. Krishnaswami (1960, 28)divided them into four—(A) Central and Western India, (B) Southern India, (C) Eastern India, and (D) Kashmir. Thapar (1965, 88) groups them into three—Northern, Southern and Eastern. But Allchin (1968, 158) feels it more proper to divide them into five—"(a) Northern group, from the vale of Kashmir ; (b) Southern group, spreading over the Peninsula, south of the Godavari river ; (c) Eastern group, including many finds from the Assam hills ; (d) Central group from hills of Central India, south of the Ganges valley ; and (e) Eastern-Central group from the hilly regions of Bihar, Orissa and Chota Nagpur."

The above groupings connote more or less the same idea and raise no controversy except in respect of province 'A' (Central and Western India) demarcated by Krishnaswami. Thapar (1965,88) omits it from his Neolithic provinces in view of the absence of a sharp distinction between the Chalcolithic and Neolithic cultural stages as manifested in their material assemblages. However, he agrees that "the economy of these Chalcolithic cultures rested on mixed farming, which in itself is a Neolithic trait". Misra (1965,94-98) of the Deccan college, Poona, quoting Prof. Childe that 'Neolithic' represents an economic stage, strongly argues for the inclusion of Deccan Trap area of the Central and Western India into Neolithic provinces. Agrawal (1968b,137), however, pleads for the exclusion of the Chalcolithic cultures of Central and Western India from the purview of the pure Neolithic phase. Discussing the issue in detail, he concludes that "on chronological, technological, as also on economic grounds", the cultures in question "do not belong to the pure Neolithic phase" and hence should be treated separately.

The present author is also inclined to think that the above controversial province should not be treated within the early Neolithic fold. No doubt, the province comprising the Central and Western India on the one hand, and the remaining provinces (mentioned above) of the Neolithic complex on the other appear to be of the same economic stage from surface-observation, but in reality they are not so. It is needless to emphasize the importance of the role of technology and raw materials in shaping and changing a particular stage of economy. If there was any metal-free phase of the Neolithic people, its stage of economy must also have differed, even if in slight degree, from that of the Chalcolithic people who had the impact of metal. At present, the archaeological evidence for the metal-free phase of the Neolithic people is by no means sufficient, however, indications of it are not completely lacking. As such, the province 'A' has not been considered here.

Of the remaining provinces only two i.e. Northern and the Southern provide radiocarbon dates[1] with which we are mainly concerned here. The following is the proposed chronology of the two provinces based on the evidence other than that of carbon-14.

Northern group

Burzahom, the key site of this group, situated in the vale of Kashmir no doubt provides valuable material for its culture-sequence, but, unfortunately, lacks datable archaeological evidence. Its last phase (Period IV), however, has been dated somewhat earlier than the Buddhist site of Harwan ascribable to the fourth-third century B. C. The third phase from the bottom is associated with a massive megalithic circle but it is devoid of iron and typical pottery of Indian Megalithic complex. There is nothing in its first two phases which can be identified as belonging to Indian tradition.[2]

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[1] We have a few dates for Chirand (Bihar) but their necessary details are not available.

[2] Some contact with Kot Diji (later phases) has recently been pointed out (Sankalia, 1970).

In fact it is a unique Neolithic culture having no Indian parallels. Under these circumstances we naturally look to the peripheral abroad for its nearest relationship.

Taking into account the stratification and finds of De Terra, V. D. Krishnaswami poses a question: could the Neolithic phase of Kile II of Kile Gul Mohammad in Baluchistan, assigned to the fourth millennium B.C., inspire the loessic Neolithic industry of Kashmir? Whatever might be the answer, he feels that the Northern Indian Neolithic would be much older than the Karnatak culture (Krishnaswami, 1960, 63). However, the material evidence of Burzahom leads us to look towards the east for its diffusionary impulses. Many of its features have been noticed in the Neolithic cultures of Northern China. Allchin points out that the perforated knife and dog burial are reported in the Aug-Aug-Nsi culture of Manchuria as its characteristic traits. Similarly bone industry, including harpoons, as he mentions, is also a frequent occurrence at Northern Chinese Neolithic sites. It may, however, be pointed out that the "Burzahom ceramic industry is not obviously comparable with any Chinese Neolithic pottery." He suggests a distant relationship of Burzahom grey burnished ware with pottery of 'South India'. Thapar (1965,93) indicates that "in the Shang Period (latter half of the second millennium B. C.), which marked the appearance of the Bronze Age, the harvestor type survived along with the shouldered celt. Since no shouldered celts are known from Burzahom, it is arguable that the harvestor type had reached Kashmir before the Shang Period".

Southern group

The evidence of Brahmagiri (Wheeler, 1947-48) for the first time placed the Neolithic culture of the South in a stratigraphic sequence. Towards its end it overlapped the iron-using Megalithic culture which, on the basis of some positive datable evidence found in its succeeding period (Period III, Andhra culture) at the site, has been dated to c. 2nd century B. C. Its preceding culture is Neolithic. It is divided into two sub-periods—IA and IB with a weathered surface between the two. It is characterized throughout by the presence of polished-buff axes of trap-rock associated with numerous crude microliths of jasper, flint, agate, opal and rock crystal. Of them, the specialized types, such as the trapeze, triangle and crescent, are very rare or entirely absent. Metal (copper and bronze) appears in sub-period IB. No iron is associated with this culture. The pottery is invariably handmade. Simple globular vessels of an unvarying type are present throughout. In the lower levels (IA), however, are found occasional sherds of painted and incised ware. These wares are absent in the upper one (IB). Burials, here, are of two kinds but none of them is associated with Phase IA. For the beginning of this culture which has an accumulation of 7–9 feet having an interruption in the occupation the excavator suggests the earlier half of the lst millennium B. C. or c. 1000 B. C.

The evidence of Sanganakallu (Subbarao, 1948) stands next to Brahmagiri in placing the Southern Neolithic Culture into a stratigraphical context. While originally excavating it, Late Dr. Subbarao observed three culture-phases*, viz. Megalithic (Phase III), Neolithic (Phase II) which is further divisible into two sub-periods on the basis of pottery, and lastly heavily patinated flake-phase (Phase I)— the earliest at the site. It is reported to have been separated from its succeeding Phase II_1 by a thin barren layer. All of them are devoid of any positive datable material.

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*The subsequent excavations under the direction of Dr. Sankalia (IAR, 1964-65,55) revealed that the microliths succeeded the patinated flake industry in trap and brought to light a fourfold culture-sequence at the site.

Period III, representing Neolithic, is divisible into two phases mainly on the basis of pottery. Phase I is associated with hand-made pale grey and burnished grey wares. In Phase II wheel-made black painted red ware appears indicating, according to the excavator, a new intrusive element. Metal is all along absent.

Phase I, sometimes pleaded as proto-neolithic phase, is mainly characterized by heavily-patinated flakes of trap and sandstone associated with a crude microlithic industry of quartz and chert, without any evidence of pottery. The succeeding Phase II marks a fully developed stage of Neolithic culture characterized by polished stone implements, microliths with a bias for the parallel-sided blades and pottery. Metal is totally absent. Pottery consists of crude and coarse hand-made ware associated with a few hand-made burnished types. Along with this is also found pale-grey ware, generally made of fine clay mixed with lime and mica. Pale-grey ware is predominant in its lower sub-phase. In the upper sub-phase the coarse brown-and-black ware becomes dominant. Besides, a few painted sherds and hand-made burnished ware are also reported from its upper sub-phase. It may be noted that in the same fabric (burnished ware) a few spouts are also found from the same level.

On the basis of similarity in yields the Sanganakallu Phase II (sub-period-2) has been equated with Phase I of Brahmagiri by the excavator. Krishnaswami (1960, 50) feels that "since the lower levels of Brahmagiri I and, derivatively, Sanganakallu II (sub-period-2) are ascribed to 1,000 B. C., the earlier sub-phase (sub-period-1) of Phase II and Phase I of Sanganakallu must be far anterior to that date, specially as there is a sterile layer intervening in between."

The Piklihal (Allchin, 1960) evidence further confirms the stratification of Southern Neolithic. The culture-sequence at the site comprises, from the top, Medieval, Early Medieval, Early Historical, Iron Age, and Neolithic. The Iron Age and the Neolithic periods are marked by an intervening cultural phase which is said to have witnessed an intrusion from the north. The evidence rests upon a very small number of sherds of wheel-thrown painted ware comparable to those from Brahmagiri and is also related to certain pottery of Maharashtra suggesting an impact of the Chalcolithic people.

The Neolithic period is divisible into two phases, the Lower and the Upper. The Lower Neolithic is characterized by typical Neolithic ground stone and blade industries, pottery, terracotta figurines of bull, and remains of human and animal bones. No metal is associated with this phase. Of blade industry it may be mentioned that it occurs throughout all levels without any discernible change either in raw material or in tool types. The characteristic types mainly comprise blades, guide-flakes, and geometrical forms. The raw materials include chert, chalcedony, opal and quartz. The ceramic industry includes wares *without burnish*, having grey, black and buff shades and also incised and perforated vessels (A1) ; those *with burnish but without slip* having the same shades, some of them being ochre-painted, generally in bands (A2) ; and those *with burnished slip* having red, black, brown, ochre-chocolate shades, as well as painted ware (A3) [Allchin, 1960]. The legged stands of A3 red ware are characteristic. The clay is micaceous which dominates the entire range of the Lower Neolithic wares. They are manufactured generally on low firing and particularly where mica has been used. They are completely devoid of straw and are hand-made, prepared on turn-table and Dabbar and Anvil techniques.

The Upper Neolithic is distinguished from the Lower by the disappearance of A3 wares including the painted one, and the appearance of burnished and slip wares (A4, A5). The A1 and A2 wares, however, continue. Of the peculiar shapes, and features, mention may be made of spouts and finger-tip impressed decorations. Technologically they are hand-made (wheel-made pots appear almost at the end of the Upper Neolithic). The clay used is gritty and the surface of pot is rusticated (roughened), specially upon vessels of A1 ware. Other striking innovations of this phase are the occurrence of copper, bronze, disc beads (five in number) of magnesite or shell, and beads of carnelian (single example). It may be noted that the material of disc bead is still undetermined. However, it is reported that "it appears to be of magnesite or steatite paste". Of the other material finds, mention may be made of polished-stone implements, blades and remains of human and animal bones.

The Lower and the Upper phases of Piklihal have been compared with Brahmagiri IA and IB respectively. Further, they have also been equated with sub-periods 1 and 2 (Phase II) of Sanganakallu. But it may be recalled that Subbarao has compared only the Upper Phase of Sanganakallu II with the
387 combined IA and IB of Brahmagiri. Its Lower Phase (II$_1$) is said to have been comparatively earlier than that of Brahmagiri. The Upper Neolithic at Piklihal also corresponds to Maski I.

Now a few words about the main results of its wider comparisons. The zones of comparison include Maharashtra and Malwa, Saurashtra, the Indus valley and Baluchistan, and the Iranian plateau.

In Maharashtra no parallel to the pottery forms which appear at Piklihal in its Lower Neolithic is indicated. However, a few types of Jorwe, Nasik Period I and some potting technique of Bahal IA and Prakash I are reported to have significant affinities with Piklihal (Upper Phase).

At Saurashtra the burnished and unburnished grey and buff wares (all hand-made and turn-table built which run side by side with Harappa wares occurring throughout the levels at the site)—the second distinct industry of Lothal—and also the dressed and 'red-and-black' sherds have been compared with the A1, A2, A3 and A4-5 types of Piklihal. The excavator

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of Piklihal also finds striking affinities, though equally striking contrasts, between some of the finds of the Deccan Neolithic and Indus civilization. He feels that resemblance in blade industry, ground and pecked tools, copper metallurgy, steatite disc beads and the place of the *bos indicus* in the life and economy of both cultures, provides some general indication of culture-contact. It may, however, be noted that copper and beads occur only in the Upper Neolithic phase at Piklihal.

Though no direct evidence of contact is available at present, the terracotta bulls of Mehi or Kulli, reported from the valley of Baluchistan, are regarded as highly suggestive in this respect. Again, he demonstrates some relationship in the technique and to some extent in the form of potting, between various sites of North-east Iran (Hissar, Turang Tepe, Shah Tepe etc.) and Piklihal. On this basis some sort of culture-contact between the two has been claimed. He also suggests North-east Iran as the source for Piklihal culture. The date for the breaking away from them other-culture has been proposed as c. 2100 B.C.

The end of Southern Neolithic Culture at Piklihal has roughly been dated to c. 7th/6th century B.C. This conclusion is based on the date of the 'intrusion' which brings to an end the Neolithic period at the site. In its turn the date of intrusion largely depends upon the dating of 'red-and-black' ware complex. Tracing it back to Necropolis B of Sialk, and the cairn burial sites of Baluchistan, through Nasik, Bahal, Maheshwar and Ahar, and accepting Gordon's proposed date for the movement of cairn-builders into Baluchistan (c. 850 B.C.) and allowing a sufficient margin for their settling in the region, the date of the intrusive AB ware of Piklihal has been estimated at c. 7th/6th century B.C.

On the basis of the above cross-dating c. 2000-1250 B. C. and 1250—650 B.C. have been proposed for the Lower and the Upper Neolithic phases respectively at the site.

Utnur (Allchin, 1961) is another excavated site for which detailed report is available. It has twofold culture-sequence, the Early Historical (Period V) and the Neolithic (Periods I to IV). Periods I, II and III are further divided into IA, IB, IC; IIA, IIB; and IIIA, IIIB. Culturally, its entire Neolithic deposit is equated to that of the Lower Neolithic of Piklihal. The Upper and the 'intrusive' phases found at Piklihal are absent here. It is characterized by the occurrence of pottery, Neolithic blade industry, ground and pecked stone implements, bone tools ?), and human and animal remains. No metal is asscciated with this phase. The pottery industry comprises unburnished (A1), burnished (A2), and burnished slip or dressed (A3) wares. The colour of the surfaces of A1 and A2 sherds is predominantly grey with buff, brown and black shades; the colours of A3 sherds are red, black, brown and ochre-chocolate. The types mainly include the shallow platters, open bowls of various shape and size, open-mouthed and narrow-necked jars (A1 and A2 wares). Of the unique types mention may be made of a hollow-footed cup and bell-shaped storage jar. Besides plain ware, a few incised (all in A1 ware), and post-firing ochre-painted wares (A2) are also reported. A3 ware has a thinner body section than those of A1 and A2. A careful pairing of inner surface is another characteristic feature of this ware (A3). The colour of its painted variety is mainly purple ochre.

The over-all features of blade industry indicate that it was a product of amateures rather than specialists. The level of derivation is strictly confined to Neolithic deposits ; not a single specimen comes from the Early Historical phase. The materials used are mainly chert, chalcedony or crystal. Tools from the excavation comprise blades, backed blades and lunates. Besides, cores and flakes are also reported. The ground and pecked stone industries comprise rubbers, grinders and hammers. Edge tools are almost absent. However, a few are reported from surface-collections. Nearly all the tools are crudely made and are highly worn. The excavator compares the industries, despite certain new features (both technological and typological), with those from Bellary and Piklihal.

A number of pieces of cut bone are also reported, of which one appears to be chisel-like blade.

Of the structural activity cattle-pens (roughly square and polygonal in form) and 'flimsy huts' outside the pens are the only remains. An infant burial and a large number of animal bones have also been found.

On the basis of close similarity between the assemblages of Utnur (Periods I to IV) and Piklihal (Lower Neolithic phase), the Neolithic deposit at the former site has also been dated to c. 2000—1250 B. C.

But in connexion with Utnur dating, the following points may be noted which have important chronological significance.

a) Some of the features of its ground and pecked industries quite distinctly separate them from those o Piklihal and Sanganakallu, with which they have been compared. The raw material, technique, tool types and state of preservation are all different. There is a marked absence of basalt and axe group at Utnur (from the excavation). The evidence of flaking is almost negligible here. It also lacks the technical finish. From the point of view of craftmanship Utnur stands far behind Piklihal and Sanganakallu. The state of preservation of tools is also different. At Utnur there are very few examples of finished tools, most of them being highly worn

b) The blade industry also, on the whole, seems to be a product of beginners.

c) Similarly, pottery industry also indicates, comparatively, inferior craftmanship at Utnur. The 'A' ware here is generally coarser and heavier than the Piklihal ware. Its functional range is also much more limited. The Utnur potters seem to have manufactured only utilitarian pots. It appears that they were not familiar with luxurious and complicated types, such as legged stands, legged vessels etc. Certain special forms present throughout the Neolithic phase at Piklihal are also not represented at the ash-mound of Utnur.

Now the problem arises whether these features suggest some modification in Utnur date-bracket proposed by its excavator.

We have a few more important excavated sites besides Brahmagiri, Sanganakallu, Piklihal and Utnur. These are Kodekal, Terdal, Tekkalakota, Palvoy, Hallur, T. Narsipur, Bainapalli, Maski, Nagarjunikonda etc. They also conform to the stratigraphy of the above discussed sites and provide homogeneity in results except for certain minor differences which of course are not without significance. It may be noted that Hallur I and lower level of T. Narsipur I are free from metal, while Tekkalakota I furnishes evidence of metal as well as spouts.

C^{14} DATES SCRUTINIZED

So far eight dates for the Northern and twenty seven for the Southern Neolithic sites are available. These sites include Burzahom of Northern Group and Kodekal, Utnur, Nagarjunikonda, Terdal, Tekkalakota, Sanganakallu, Palvoy, Hallur, T. Narsipur and Bainapalli of Southern one. All the C^{14} dates for Nagarjunikonda are in complete disagreement with the archaeological estimate. A few others are only of neutral value. However, majority of them are valid. But before embarking upon details it is well to bring into focus some of the difficulties caused by the substandard data which create hindrance in their systematic processing. The processing begins, as mentioned above (Chap. 1), with the evaluation of the relationship between C^{14} measurements and their corresponding archaeological estimate. The screening of their relationship is necessary to check the discripancy between the two. But the available data do not always meet the requirements of the checking. It is clear from the fact that most of the C^{14} dates for the Neolithic deposits at the above mentioned sites are not furnished with their corresponding archaeological dates which precludes the working out of the exact variance between the two. It is surprising to note that in majority of cases not even the corresponding archaeological phases of radiocarbon dates are available. For archaeological date, generally, a round term, such as 'Neolithic culture' or 'Chalcolithic culture', has been used, which is too vague to fulfil the requirements of thorough investigation. The other difficulty is still more serious because it sometimes prevents us from assessing the correct position of consistency or inconsistency, as the case may be, of the C^{14} dates in relation to their corresponding stratigraphic sequence. The assessment of their consistency is of vital importance, since it is the only dependable means by which the validity of radiocarbon dates can be judged. And in the absence of clear indication about the squence of the corresponding layers of C^{14} dates, the working out of assessment is bound to suffer from ambiguity. The given dates for a particular culture are, of course, furnished with full locus including the layers of derivation of their samples, but the interrelationships of these layers are seldom indicated. The nature of above relationships, are no doubt, self-explanatory where the layers in question belong to a single trench, but where they are from different trenches the confusion is bound to crop up. Thus, in view of the seriousness of the problems indicated above some definite norm should be evolved to avoid ambiguity. It can substantially be overcome if the C^{14} dates are provided—where several dates are available for a particular phase—strictly according to the sequence of layers along with sufficient stratigraphical details.

The followings are the details of site-wise examination—within the framework formulated above (Chap. I)—of the C^{14} dates available for the above mentioned sites.

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Northern Group

Burzahom (Lat. 34° 10′ N., Long. 74° 52′ 30″E.)

It is a key site of Northern Neolithic Culture. Its earlier phase (Period I) is characterized mainly by stone implements, effective bone tools, hand-made pottery and circular pits. Period II is marked with the appearance of structures of mud and mud bricks, potters' wheel, metal (copper, and the evidence of burials (IAR, 1961-62, 17).

From its Neolithic deposits eight samples, namely TF.10, TF.129, TF.127, TF.128, TF.15, TF.13, TF.14, and TF.123 have been measured. The first sample TF.10, is derived from layer 6, and the subsequent three—TF.129, TF.127, and TF.128—are from layer 13 at varying depths. All of them belong to one and the same trench i.e. BZH-1. Of the last four samples—TF.15, TF.13, TF 14, TF.123—the first, second and fourth are obtained respectively from PIT A, PIT 12, and PIT C. They (except TF.14) belong to trench BZH-3. The level of TF.14 is not reported.

None of the samples is provided with either specific or relative archaeological date. Except sample TF.10 which is reported from the Mud Phase (Phase II), the rest are not even furnished with their corresponding archaeological sub-phases. Only a round term (Neolithic Period) has been mentioned. Besides, the position of their stratigraphic sequence is also not clearly indicated, giving rise thus to a fundamental difficulty in assessing the status of radiocarbon dates in relation to relevant stratigraphy. However, inspite of it some idea of consistency or inconsistency may be formed by arranging them into trench-wise groups. Further, to form a probable sequence the dates of each group may be arranged layer-and depth-wise too.

On this line of working all the Burzahom dates may be classified into two groups. TF 10, TF.129 (?), TF.127 and TF.128 may be placed under Group A, as they belong to one and the same trench (BZH-1). The

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C^{14} dates of this group read 705±105 B.C. for TF.10 (Agrawal, 1965d, 5); 1825±100 B. C. for TF.129 (Agrawal, 1966a, 4-5; 2100±115 B. C. for TF.127 and 2375±120 B. C. for TF.128 (Agrawal, 1965a, 42-43). The remaining three[1] dates (TF 15, TF.13 and TF.123), all from trench BZH-3, similarly have been put in Group B. Here it may be noted that the relative position of the level of TF.13 (Pit 12) is not very certain. However, in want of any better guide-line it has been placed in the sequence mainly on the basis of its depth. The C^{14} dates of this group read 1535±110 B. C. for TF.15; 1850±125 B. C. for TF. 13 (Agrawal, 1965 d, 5); and 2225±115 B. C. for TF. 123 (Agrawal, 1965a, 42-43).

The following tables illustrate the probable stratigraphic sequence and their corresponding radiocarbon determinations :

TABLE 1

(Group A)

Index	Trench	Stratum	Arch. Date	C^{14} Date[2]
TF. 10	BZH-1	Layer 6, Depth 1.55 m.	Neolithic Pd. Mud Phase	705±105
TF. 129	BZH-1 (?)	Layer 13, Depth 2.9 m.	Neolithic Pd.	1825±100
TF. 127	BZH-1	Layer 13, Depth 2.92 m.	Neolithic Pd.	2100±115
TF. 128	BZH-1	Layer 13 Depth 3.9 m.	Neolithic Pd.	2375±120

Sample No. TF.14 has been omitted since its level of derivation is not available. However its C^{14} date reads 2025±350 B. C. (Agrawal, 1965a, 42-43).

C^{14} dates in all tables are in years B. C., unless mentioned otherwise.

TABLE 2

(Group B)

Index	Trench	Stratum	Arch. Date	C^{14} Date
TF. 15	BZH-3	PIT A, Depth 1.85 m.	Neolithic Pd.	1535±110
TF. 13	BZH-3	PIT 12, Depth 1.93 m.	Neolithic Pd.	1850±125
TF. 123	BZH-3	PIT C, Depth 2.8-3.5 m.	Neolithic Pd.	2225±115

In the absence of data it is not possible to work out the correlative stratigraphic sequence of the dates of the two groups in one unit. Hence, an independent treatment has been given to each group.

As regards the relationship of C^{14} dates with the corresponding archaeological estimates, it may be pointed out at the very outset that, in absence of relevant data the working is not possible. However, on internal comparison of the C^{14} dates of each group in relation to their corresponding stratigraphic sequence, the position of their internal consistency may be worked out. It is obvious that the dates of Group A (Table 1) are fully consistent, since the date of layer 6 (TF.10, 705±105 B C.) is younger than that of layer 13 (TF.129, 1825±100 B. C.). The date further increases while we proceed towards still lower levels. For example, the measurement of the sample derived from layer 13 (TF.129) at a depth of 2.9 m. is comparatively young in relation to the samples obtained at the depths, of 2.92 m. (TF.127) and 3.9 m. (TF.128). Similarly the dates of Group B (Table 2) are also internally consistent with the corresponding stratigraphic sequence. The date of PIT A (TF.15), representing the uppermost level of this group, is younger than any of the dates of the lower levels (cf. TF.15, TF.13, and TF.123).

Now while examining the interrelationship of Burzahom C^{14} dates in the light of "counting error", it has been observed that the difference of any two dates, in consecutive order, is 'real' with 95% level of confidence; for on adding two standard deviations to the younger date and one to the older, the younger still remains younger.

The scrutiny of C^{14} dates, as attempted above, fully confirms the archaeological attribution of distinct personalities to the levels from which the samples are derived. But in this connexion it may be pointed out that the archaeological observation about layer 13 demands a re-examination; for the three samples derived from various depths (TF.129, 2.9 m.; TF.127, 2.92 m.; TF.128, 3.9 m.) of layer 13 do not provide the same date even 'within the range of 'counting errors'. As the differences in the dates are 'real' with 'a maximum level of confidence', it appears that the layer 13 can be broken into three separate layers. The observation acquires further strength because the dates are internally consistent in relation to depth.

As regards the determination of C^{14} based time-bracket of Burzahom, it may be noted that the available data are not sufficient Except TF.10, reported from the Mud Phase, none of the remaining samples is provided with archaeological phases. However, on the basis of the extreme valid dates (TF.128 and TF.15), a bracket reading 2375±120 B.C.-1535±100 B.C. or c. 2400-1500 B.C. may be suggested for the 'pre-Mud Phase' (?) at the site.

Southern Group

Kodekal (Lat. 16° 21′ N., Long. 76° 24′ E.)

For Kodekal only one date TF.748, is available (TIFR Date List 1968 b, December). The sample is derived from layer 4 at a depth of 2.3 m. of trench No. 2. Neither specific nor relative archaeological date of layer 4 is reported; only a round term—Neolithic Period—is mentioned. Its radiocarbon determination reads 2460±105 B.C.

In want of specific archaeological date for the layer in question it is not possible to examine its exact relationship with the obtained C^{14} date ; nor is any internal checking possible as the date is a solitary one. Further, in absence of information regarding the position of the layer in question (whether basal or subsequent) it seems immature to derive any meaningful conclusion. Despite these, the C^{14} date in question remains significant, because it dates the earliest culture at the site It at least indicates that the Neolithic people lived here around 2500 B. C. (2460±105 B. C.). It provides also the earliest carbon-14 date for the Southern Neolithic sites so far measured. But in view of the criteria adopted here it seems to be of a neutral value for our purpose.

Utnur (Lat. 16°0′ 40″ N., Long. 77° 38′E.)

It is a multi-culture site with twofold culture sequence, the Neolithic and the Early Historical (Allchin 1961, 24). The former is further divided into four Periods (I to IV). Periods I, II and III are again sub divided into IA, IB, and IC ; IIA and IIB ; and IIIA and IIIB respectively. The above divisions have been made mainly on the ground of structural activity ; culturally they all belong to the same period.

From its Neolithic deposits the results of three samples TF.168, TF.167 (Agrawal, 1964b, 266-269), and BM-54 (Barker, 1960, 26) are available so far. They are derived from layers 5 (depth 75 cm.), 7 (depth 1.40 m.) and IIA (depth not mentioned) respectively. They correspond to sub-Periods IIIA, IIA, and IB at the site. The specific archaeological dates are not reported for any of the samples. However, here the Neolithic deposits, on the basis of close similarity with Lower Neolithic Phase of Piklihal (the Upper Neolithic Phase of Piklihal is not represented here), have been dated to c. 2,000-1250 B. C. The radiocarbon determinations read 2040± 115 B. C. for TF.168, 2050±115 B.C. for TF.167, and 2300±155 B. C. for BM-54.

TABLE 3

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 168	Layer 5, Depth 75 cm.	IIIA (Early Neolithic)	2040±115
TF. 167	Layer 7, Depth 1.40 m.	IIA (Early Neolithic)	2050±115
BM. 54	Layer 11A, Depth not available	IB (Early Neolithic)	2300±155

While examining the relationship of C^{14} dates with the corresponding archaeological estimates, it may be noted that in absence of specific archaeological dates it is not possible to calculate their exact variance. However, on the basis of general estimate suggested for the entire deposit, some tentative idea may be formed. The comparison reveals that all the three C^{14} dates are older than even the suggested lower archaeological bracket (2000 B. C.). TF.168 (Pd. IIIA, 2040±115 B. C.) is older by 40 years, TF. 167 (Pd. IIA, 2050±115 B. C.) by 50 years and BM-54 (Pd. IB, 2300±155 B. C.) by 300 years. The differences would further increase, because here all the dates have been calculated on the lower archaeological bracket (Pd. IA) in want of archaeological dates for all the corresponding C^{14} determinations. However, it is significant that the results of C^{14} measurements are internally quite consistent with the stratigraphic sequence at the site. The difference between BM-54 and TF. 167 (of 250 years) is almost 'real' because by adding two standard deviations on the younger date and one on the older, the younger still remains younger. But the comparison of TF. 167 with TF. 168, showing a difference of only 10 years, indicates that they are of the same value within the range of 'counting error'. The 'mean' of the two dates reads 2045±81 B. C.

As regards the determination of C^{14} based time-bracket for the Neolithic deposit at the site, it may be recalled that the available dates do not pin point its 'earliest' and 'latest' levels. However, on the basis of maximum spread on central value, c. 2300 B. C. and c. 2045 B. C. seem to be the lower and upper time-bracket respectively with a span of 255 years for Pds. IB to IIIA.

Terdal (Lat. 15°59′30″ N., Long. 75°5′E.)

It is a Neolithic (?) - Megalithic site (IAR, 1965-66, 65). For its Neolithic deposits two dates TF.684 and TF.683 are available (Agrawal, 1967, 566-568). The samples are derived from layers 2 and 3 at the depths of 17-25 cm. and 45-65 cm. respectively, and both of them belong to trench No. 1. None of them is furnished with specific archaeological date, only a round term, Neolithic period (and that too with a question mark), is reported. Their radiocarbon determinations read 1935±100 B.C. for TF.684 and 1770±120 B C. for TF 683.

TABLE 4

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 684	Layer 2, Depth 17-25 cm., Trench No. 1.	Neolithic Pd. (?)	1935±100
TF. 683	Layer 3, Depth 45-65 cm., Trench No. 1.	Neolithic Pd. (?)	1770±120

The internal comparison of C^{14} dates and the assessment of their consistency, as borne out by the stratigraphic sequence, reveal that the date obtained for the lower level (layer 3, TF.683, 1770±120 B.C.) is younger than the date of the higher level (layer 2, TF.684, 1935±100 B.C.). The result, thus, is not consistent. In this connexion it may also be noted that the sample TF.684, reported to have been derived 'from a post', suffers from 'post sample growth error' (Agrawal, 1967, 566-568). In view of these observations the date in question may not be treated valid. Besides, its result seems to be doubtful also on the ground that the time-gap of 165 years between two consecutive layers (2 and 3) appears to be too large.

The validity of the remaining date (TF.683) also becomes doubtful, since it acquires the status of 'solitary' one. Even if it is free from contamination and the date is genuine, it ceases to be of any value as it offers little scope for vertical checking. As such, unless and until its result is further tested and confirmed by more dates, either from its preceding or succeeding strata, the present reading remains questionable.

Tekkalakota (Lat. 15° 32′ N , Long. 76° 53′ E.)

It is a multi-culture site, the earliest being Neolithic (IAR, 1964, 25). For this deposit results of four samples TF.262, TF.266, TF.237 and TF.239 are reported (Agrawal, 1965c, 394). They are derived from layers 1, 2, 4 at the depths of 0.25 m., 0.18 m., 1 m. respectively and pit 4 SB layer 4 the depth of which is not reported. TF.262 and TF.266 belong to trench Nos. 9 and 2 respectively, and TF.237 and TF.239 to trench No. 1. None of them is provided with specific archaeological date. Besides, the position of their stratigraphic correlation has also not been clearly indicated, producing thereby an initial difficulty in examining the validity of radiocarbon determinations. Their carbon-14 dates measure 1610±140 B.C. for TF. 262 ; 1780±105 B.C. for TF.266 ; 1615±105 B.C. for TF.237 and 1540±105 B.C. for TF.239.

TABLE 5

Carbon-14 Dates and probable
Corresponding Stratigraphic Sequence (?)

Index	Locus	Arch. Date	C^{14} Date
TF. 262	Layer 1, Depth 0.25 m., Trench 9	Neolithic Pd.	1610±140
TF. 266	Layer 2, Depth 0.18 m., Trench 2	Neolithic Pd.	1780±105
TF. 237	Layer 4, Depth 1 m., Trench 1	Neolithic Pd.	1615±105
TF. 239	Pit 4 SB Layer 4, Depth (?) Trench 1	Neolithic Pd	1540±105

Here the stratigraphic sequence of the determinations is not clearly mentioned (layer 1 belongs to trench No. 9, layer 2 to trench No. 2, layer 4 to trench No. 1, and pit 4 SB layer 4 to trench No. 1). However, the position of their internal consistency may tentatively be examined with an assumption (based on the order of layers) that their corresponding layers are correlated. The radiocarbon determinations of the samples plotted above (Table 5) demonstrate that the results are not fully consistent. The date for pit 4 SB layer 4 (TF.239), measuring 1540±105 B.C., the earliest sample at the site on account of its being derived from its earliest dated level, provides the latest date (cf. dates for layer 1, 2 and 4). Similarly the date for layer 4 (TF.237) reading 1615±105 B.C. is younger than that of its higher level, layer 2 (TF.266) which reads 1780±105 B.C. Thus, the results of these samples are inconsistent. It may be noticed that TF.237 and TF.239 remain inconsistent with TF.266, even if their values are treated within the range of 'counting error'. As such these two dates TF.237 and TF.239) have been excluded. The remaining two dates (TF.262, layer 1, 1610±140 B.C. ; TF.266, layer 2, 1780±105 B.C.) are consistent.

While determining the time-bracket of the Neolithic deposits at the site, it must be mentioned at the outset that the available data are not sufficient. No valid date is available for the lower level (the two dates obtained for early levels TF 237 and TF.239 have been omitted for the reasons mentioned above). Of the other two dates, TF 262 undoubtedly provides us the upper time-limit since it is derived from the top layer which reads 1610±140 B.C. Regarding TF.266 (1780±105 B.C.) derived from layer 2, it is difficult, in want of archaeological informations, to affirm the particular sub-phase at the site to which it belongs. However, on the basis of the available oldest date, the Neolithic deposits at the site may be bracketed within c. 1800-1600 B.C. The possibility of a date c. 2000 B.C. for the lower limit, as suggested by its excavator (Nagrajrao, 1965, 11), may not be ruled out.

Sanganakallu (Lat. 15° 11′ N., Long. 76° 58′ E.)

It is also a multi-culture site having fourfold culture-sequence (IAR, 1965, 55). Period III is Neolithic. For this deposit results of three samples—TF. 355, TF.354 and TF.359—are available (Agrawal, 1966 c. 585). They are derived from layers 2, 3 and 4 at the depths of 1.40 m., 2.5 m., and 2.4 m. respectively. The first sample belongs to trench No. SKL, S. Rao's II. The next two belong to another trench, i.e., '1-2'. Their specific archaeological dates are not available. However, they are reported to be from the early level of this deposit. Radiocarbon determinations read 1585±105 B.C. for TF.355; 1590±110 B.C. for TF.354; and 1550±105 B.C. for TF.359.

TABLE 6

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 355	Layer 2, Depth 1.40 m., Trench SKL, S. Rao's II.	Early Level, Neolithic Pd.	1585±105
TF. 354	Layer 3, Depth 2.5 m., Trench 1·2	Early Level, Neolithic Pd.	1590±110
TF. 359	Layer 4, Depth 2.4 m., Trench 1-2	Early Level, Neolithic Pd.	1550±105

Here also, in the absence of specific archaeological dates, it is not possible to work out the exact relationships between C^{14} measurements and their corresponding archaeological estimate. However, the position of internal consistency of C^{14} dates with their corresponding stratigraphic sequence may be worked out. The comparison of the first two dates (TF.355, 1585±105 B.C. ; and TF.354, 1590±110 B.C.) for layers 2 and 3 respectively reveals that the latter is older than the former by 5 years. The result, thus, is consistent. But the date for layer 4, the earliest dated level, is not consistent with other dates. It is younger (by 40 years) than the date of its immediately succeeding layer (cf. TF.359 and TF.354). The 'mean' of the two consistent dates (TF.355 and TF.354), reads 1584±75 B.C. or c. 1600 B.C., which provides the lower time-limit (not the lowest one) to the Neolithic deposits at the site.

Palvoy (Lat. 14° 31′ N., Long. 77° 09′ E.)

We have only one date TF.701 from Palvoy (TIFR Date List, 1968a, June). The sample is derived from layer 9 at a depth of 3.5 m. Neither its corresponding archaeological date nor the phase is mentioned. Only a round term, Neolithic culture, has been used. The C^{14} date reads 1965±105 B.C.

On account of its being a solitary date it is not possible to examine its validity. Hence, it has been treated to be of a neutral value.

Hallur (Lat. 14°20′ N. Long. 75°37′ E.)

It is also a multi-culture site (IAR, 1965, 57). For its Neolithic deposit the results of five samples, TF.570, TF.573, TF.575 (Agrawal, 1966c, 585-86); TF.586 (TIFR Date List, 1967b, Dec.); and TF.580 (TIFR Date List, 1966b, Aug.), are reported. They are derived from layers 4, 5, 7, Pit SB 8, and 14 at the depths of 1.80 - 2.10 m., 2.35 - 3.35 m., 3.2 m., 2.8 m. and 6.1-6.4 m. respectively. The specific archaeological dates of these samples are not available. However, the first two (TF.570 and TF.573) are reported to be from the Megalithic-Neolithic-overlap phase, the next two from the late (TF.575, TF.586) and the last one (TF.580) from the early Neolithic phase respectively. Their corresponding radiocarbon dates read 1105±105 B.C. for TF.570; 955±100 B.C. for TF.573; 1030±105 B.C. for TF.575; 1195±105 B.C. for TF.586 and 1710±105 B.C. for TF.580.

TABLE 7

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 570	Layer 4, Depth 1.80-2.10 m., Trench 1	Megalithic-Neolithic-overlap phase	1105±105
TF. 573	Layer 5, Depth 2.35-3.35 m, Trench 1	Megalithic-Neolithic-overlap phase	955±100

TABLE 7 (Contd.)

TF. 575	Layer 7, Depth 3.2 m., Trench 1	Late Neolithic Period	1030±105
TF. 586	PIT SB 8, Depth 2.8 m., Trench 2	Phase IIB, Late Neolithic Period (?)	1195±100
TF. 580	Layer 14, Depth 6.1 m.-6.4 m., Trench 1	Early Neolithic Period	1710±105

The results of TF.570 and TF.573 (obtained from layers 4 and 5 respectively) derived from the Megalithic-Neolithic-overlap phase are inconsistent, since the date (955±100 B.C.) for lower level is younger by 150 years than the date (1105±105 B.C.) of its upper level. But, it is important to note that barring TF. 570 (layer 4) the rest (TF. 573, TF. 575 and TF. 586 belonging to the Megalithic-Neolithic and the late Neolithic phases) are fully consistent. The remaining one date (TF.580) obtained for the site's early phase creates some difficulty in local checking since a single date is available for that phase. But it is significant that its result in the perspective of total dated samples (barring TF.570) provides an uninterrupted consistency borne out by the stratigraphic sequence. Besides, the interval of 515 years for the intervening five layers (8 to 14)—indicated by the difference between C^{14} dates for layers 14 (1710±105 B.C.), on the one hand, and 8 (1195±100 B.C.), on the other — is not unreasonable. It also supports the stratigraphic consistency contended above and vindicates the archaeological validity of C^{14} date reading 1710±105 B. C. for the earliest level of this deposit.

For the Megalithic-Neolithic-overlap phase we have only one valid date reading 955±100 B. C. (TF. 573, layer 5) which corresponds to its late level, not the latest, as it has a deposit of one more layer over it. However, in the light of extension limit c. 900 B. C. may be estimated for its (Megalithic-Neolithic) upper bracket. Though no direct date for its lower limit is available, the date obtained for the late Neolithic level may in this context be used.

For the Upper Neolithic phase there are two valid dates 1030±105 B. C (TF. 575) and 1195±100 B. C. (TF. 586). Both of them correspond to its late level. On the basis of extreme date (1030±105 B. C), its upper as well as the lower limit of the Megalithic-Neolithic-overlap phase, may be dated around 1000 B. C.

For the Lower Neolithic phase we have only one date reading 1710±105 B. C. or c. 1700 B. C. which corresponds to its earliest level.

The present evidence, thus, provides a time-bracket—1710±105 B. C. to 955±100 B. C. or c. 1700 to 900 B. C.—with a span of 800 years for the Neolithic deposits (including the Megalithic-Neolithic-overlap phase) at the site.

T. Narsipur (Lat. 12°13′ N, Long. 76°55′ E.)

It is also a multi-culture site (IAR, 1965, 59). For the Neolithic deposits only two samples TF. 412 and TF. 413 have been measured so far (Agrawal, 1966c, 585-86). They are derived from layer 6 and Pit IV SB layer 6 at the depths of 1.6 m. and 1.77 m. respectively. None of them is provided with specific archaeological date. The radiocarbon determinations read 1805±110 B. C. for TF. 412 and 1495±110 B. C. for TF. 413.

TABLE 8

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 412	Layer 6, Depth 1.6 m.	Neolithic Pd.	1805±110
TF. 413	PIT IV SB 6, Depth 1.77 m.	Neolithic Pd.	1495±110

In this case also, the exact relationship of archaeological and Carbon-14 dates cannot be ascertained for the same reasons, as discussed above. However, the position of internal consistency may be examined. The date for its lower layer (PIT IV SB layer 6) is younger by 310 years (cf. TF. 412 and TF. 413) than the date for its upper layer (layer 6). The difference of the two is 'real' with 95% level of confidence, as by adding two standard deviations on the younger date (1495±110 B. C.) and one on the older (1805±110 B. C.), the younger still remains younger. It is obvious, thus, that the results are not consistent.

Being inconsistent, both the dates seem to be invalid. But, on considerations of the possibility of contamination in the sample derived from a pit, only one date (TF. 413) has been treated invalid though, the remaining one, does not provide date for any definite phase of Neolithic deposits, yet its general validity should not be ignored, as it occurs from the earliest cultural horizon at the site. It at least indicates that the Neolithic people lived here around 1800 B. C.

Bainapalli (Lat. 12°35′ N., Long. 78°27′ E.)

We have only one date, TF. 349, from Bainapalli (Agrawal, 1966 c., 585). The sample is derived from layer 6 at a depth of 1.8 m. Neither specific nor relative archaeological date of the sample is mentioned ; only a round term, Neolithic period without mentioning even its phase, is used. Its C^{14} date reads 1485±100 B. C.

Being a solitary date its validity cannot be ascertained. Hence, it has been treated to be of neutral value.

Summary of Examination

The sitewise examination of radiocarbon dates discussed above may be summarised as below :

Burzahom, the key site (the only dated site) of the Northern Neolithic Culture has a fairly large number of C^{14} dates. But these lack certain important archaeological informations. However, the obtained dates are fully consistent with the stratigraphic sequence. On the basis of valid dates on central value; the time-bracket for Phase I (?) reads 2375± 120 B. C.-1535±110 B. C. or *circa* 2400-1500 B. C with a span of 900 years.

The C^{14} date-bracket (c 2300-2045 B. C.) for Utnur provides the earliest date amongst all the dated sites of the Southern Neolithic complex (except Kodekal, reading 2460±105 B. C. which is yet unconfirmed in the absence of sufficient dates).

The date for T. Narsipur, reading 1805±110 B. C. or c. 1800 B. C., figures only next to that for Utnur in antiquity.

Tekkalakota holds place after T. Narsipur. Its time-bracket reads c. 1800-1600 B. C.—mid (?) to upper level—with a span of 200 years.

Terdal comes next and its date measures 1770± 120 B C. or c. 1800 B C. But it may be noted that it has been treated as neutral in value.

Hallur occupies a place next to Terdal. We have only one date (1710±105 B. C. or c. 1700 B. C.) for its Phase I, which also represents its earliest level (layer 14). No date is available for the upper limit of Phase I. However, the late Neolithic phase dates 1030±105 B. C. or c. 1000 B. C. We have also one valid date (955±100 B. C.) for the late level of the Megalithic-Neolithic-overlap phase. Thus, the time-spread for the entire Neolithic deposit including the arrival of the iron-using Megalithic people at the site seems to be c. 1700-900 B. C.

Sanganakallu comes after Hallur in the order of date. It reads 1584±75 B. C. or c. 1600 B. C.

All the dates for Nagarjunikonda are in complete disagreement with the archaeological estimates.

FINDINGS

Chronological Framework

What does the above temporal order of the dated levels of various sites suggest in relation to their corresponding cultural assemblages ? Does it lead to any firm chronological frame ? In order to determine the probable chronological frame let us examine the relationships of C^{14} date-based time-brackets, deduced above, with the cultural assemblages of corresponding archaeological phases and sub-phases.

We proceed from the north. For the Northern Neolithic complex we have so far only one dated site (Burzahom) which stands almost isolated from the rest of Indian Neolithic cultures. It may, however, be recalled that it finds some cultural affinities with Neolithic cultures of Northern China and Central Asia. Thus, the question of the correlation of its C^{14} time-bracket with other dated sites of Indian Neolithic complex does not arise at present. But, incidentally, it may be pointed out that this culture seems to have co-existed with Harappa and also with Neolithic cultures of South India. Its early phase ranges from c. 2400 to 1500 B. C.

The position of the Southern Neolithic complex is different from that of the Northern one. Archaeologically, most of its settlements have either cultural affinities or have evolutionary relations to one another. Sometimes, of course, the developments are not so uniform. Again, it may be noted that in Southern India we have greater number of dated sites than in Northern India. The dated sites in order of antiquity, as revealed by C^{14} dates, are Kodekal (?), Utnur, T. Narsipur, Tekkalakota, Terdal, Hallur and Sanganakallu.

As noted above, Utnur (Phase IB-IIIA) holds the earliest time-bracket (c. 2300-2045 B. C.) among all the Southern Neolithic dated sites except perhaps Kodekal (?). The cultural assemblages of Utnur mainly include crude and highly worn ground and pecked industry, rudimentary flakes or blade tools—apparantly product of beginners, predominantly hand-made pottery comprising unburnished, burnished and burnished slip (both plain and painted) wares. Other important features of the ceramic industry are manufacture of mostly utilitarian types coarse and heavy fabric, and unfamiliarity with complicated forms such as stands, lugged vessels etc. The use of rubbing stones and querns, domestication of animals, construction of flimsy huts and cattle-pens form other features of this settlement. It is significant that it is completely free from metal. The present site, having been dated as the oldest, seems to be the earliest Neolithic settlement of the South. It, thus, may be called Phase I, but in order to distinguish it from archaeological phase we propose to name it 'C^{14} based Phase I'.

There are settlements which, are culturally more or less similar to those of 'C^{14} based Phase I', but radiocarbon dates for their early phases vary from c. 1800 to c. 1600 B. C. These settlements are T. Narsipur Phase I (c. 1800 B. C.), Hallur Phase I (c. 1700 B. C.) and Sanganakallu's early phases (c. 1600 B. C.). Their common diagnostic traits mainly comprise ground stone implements, blade-flake industries—Hallur may be treated as an exception as the blade industry is absent here—and burnished grey ware. All of them are completely free from metal. It appears from the above evidence that metal-free settlements, probably had a long span of life (700 yrs., from Utnur to Sanganakallu). It was quite natural too, for, in want of metal it was not possible to make any revolutionary progress It is also significant to note that we do not find any noteworthy development in their associated industries which remain practically the same. The time-bracket for this sub-phase (called here C^{14} based Phase IA) ranges from c. 1800 to 1600 B. C.; the lower end may even touch the upper limit of Utnur (c. 2045 B. C.) on further discovery.

In temporal-order the date obtained for Tekkalakota reading 1780±105 B. C. or c. 1800 B. C. represents the lower bracket of the second (C^{14} based) phase of the Southern Neolithic Culture. Its upper bracket may be capped by the date obtained for the Late Neolithic Phase at Hallur which reads 1030±105 B. C. or c. 1000 B. C. During this phase some important developments may be observed in the life of the Neolithic man. The most striking one is the appearance of copper. Among ceramic industries the typical wares of 'C^{14} based Phase I,' such as hand made burnished and ashy grey, persist. But a significant pottery type i. e. spout occurs in this phase. It becomes more suggestive in the context that the representations of Chalcolithic elements are more prominent in Phases II A and II B at Hallur, which, besides copper and blade industry, also witness typical black painted red ware. This phase may be called Phase II or 'C^{14} based phase II.'

The 'C^{14} based Phase IA' is very important, as it throws some valuable light on the controversy whether metal (copper) was a discovery of the Neolithic people or was introduced to them by some other agency. It may be observed in this connexion that all metal-free settlements, on archaeological ground, were considered contemporaneous, but the present investigations of C^{14} dates clearly demonstrate that they were not so. They represent, in fact, a long survival of the culture. At the present state of our knowledge we find, thus, two clear streams in the Southern Neolithic Culture—the earlier one having no knowledge of metal, representing the true Neolithic stream, surviving up to c. 16th century B. C., and the later one which seems to have witnessed the use of metal (copper) as early as about 1800 B. C., much earlier than that of the earliest date of the Jorwe-Malwa culture (Sonegaon, 1565±110 B. C.; Navdatoli, 1610±70 B. C.).

The possible chronological framework discussed above may be summed up as below :—

C^{14} based Phase I: characterized by the assemblage of Utnur IB to IIIA, extending between c. 2300—2045 B. C.

C^{14} based Phase I A: characterized by the assemblages of T. Narsipur Phase I, Hallur PhaseI and Sanganakallu's early level, extending between c. 1800—1600 B. C.

C^{14} based Phase II : characterized by the assemblages of Tekkalakota and Hallur II, extending between c. 1800—1000 B. C. *

Hints for an Indigenous Origin

The C^{14} date-based chronology reveals that the Southern Neolithic Culture had a long time-spread which, if the evidence of Kodekal (2460±105 B. C.) is taken into consideration, co-existed with the Harappa culture, and also with the other Chalcolithic cultures. It, thus, pushes back the antiquity of the Southern Neolithic Culture much earlier than that arrived at on the basis of archaeological interpretation. The interpretation of Brahmagiri (Wheeler, 1947, 202) evidence did not allow it to go beyond the 1st millennium B. C. Piklihal (Allchin, 1960, 122) and Utnur (Allchin, 1961) took it back to the 2nd millennium B. C. mainly in the light of their possible affinities with North-eastern Iran. Consequently, the excavator of Piklihal and Utnur looked for its origin in the same region (Allchin, 1960, 139 ff.)

Do the C^{14} dates provide any clue to its origin ? The horizon of possible affinities of Piklihal in North-east Iran—the suggested source region of the Southern Neolithic Culture of India—dates around the last centuries of the 3rd millennium B. C.* But curiously enough, almost the same date as obtained by radiocarbon comes for the Southern Neolithic settlements. Under the circumstances it provides practically no time for its spatial movement, suggesting thereby a phenomenon which does not seem to be in keeping with the logic of cultural dynamics. Thus, it demands a reassessment of the entire evidence which has been used for tracing the relationship of the Southern Neolithic Culture with the cultural assemblage of North-east Iran through Maharashtra, Saurashtra, Indus valley and Baluchistan (Allchin, 1960, 124).

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* On extension limit the lower bracket may go still earlier.

Let us take up one by one region-wise. From Maharashtra, as the learned excavator himself feels, no parallel to the pottery forms which appear at Piklihal in the Lower Neolithic only, is indicated (Allchin, 1960, 124). A few types of Piklihal which occur both in the Lower as well as in the Upper Neolithic have, of course, been compared with the Jorwe types. But in view of the C^{14} time-bracket (c. 1600—1200 B. C.) for the Jorwe culture, the inferences derived from the above comparisons need a second thought. In Saurashtra the burnished and unburnished grey and buff wares and dressed ware of Lothal have been equated with some of the types of A1, A2, and A3 wares of Piklihal. But, again, in the light of C^{14} evidence dating Lothal around 2200 B C. which is younger than the date of Lower Neolithic of the South, the attempt to find element of genesis of the Southern Neolithic Culture in this region requires substantial modification. As regards its affinities with some of the finds of the Indus civilization, resemblances are reported in copper metallurgy, steatite disc-beads, and the place of the *bos indicus* in the life and economy of both cultures. The comparisons of copper and beads seem to be out of context, as they occur only in the Upper Neolithic Phase (Allchin, 1960 131, 35) at Piklihal—the Lower Phase is free from, metal and disc beads. Regarding the place of *bos indicus* in the life and economy of both cultures it appears quite natural and logical to attach importance to it due to its utilitarian value for any agriculture-based economy irrespective of any cultural or trade contact. From the valley of Baluchistan no direct evidence of contact is available at present. Lastly, the generic obligation, as has been attempted to demonstrate through potting tradition between Iran (Hissar, Turang Tepe and Shah Tepe) and Piklihal, does not seem tenable when the two cultures existed on almost identical time-plane at a long distance from one another.

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* Allchin (1960, 127) suggests a date nearer to 2100 B. C. for breaking away from the source culture.

As the present position of archaeological as well as radiocarbon evidence stands, it appears in the light of above discussion that, if there was any contact or intrusion from the north, it might have been only during the late Neolithic phase; the Lower and the Upper seem to be quite free from any such contact indicating thereby an indigenous origin for the Southern Neolithic Culture. In this connexion the evidence of Utnur showing crude ground and pecked industry, coarse, heavy and non-complicated pottery, and blades manufactured by amateurs or beginners, are highly suggestive.

CHAPTER III

HARAPPA CULTURE

Despite the ceaseless efforts made by the scholars of various disciplines, the chronology of the Harappa culture has been an enigma for decades. Marshall (1931) estimated at c. 3250—2750 B. C. the time-spread of occupation at Mohenjodaro, one of the key sites of the Harappa culture, on the basis of the evidence, resting his conclusion largely upon the general resemblance with Mesopotamian sites. Gadd (1932) discussed in detail the ages of Indus or Indus-like seals discovered in Mesopotamia. The majority of seals of his list belonged to the Sargonid and Isin-Larsa periods showing substantial contacts between 2350 and 1770 B. C. However, two of them are listed as pre-Sargonid. Wheeler (1947), on the basis of the evidence of trade contact with Mesopotamia and other western sites, proposed a date-bracket of c. 2500-1500 B. C.* Since then practically no additional evidence has come to light to change this view, so far as archaeological cross-datings are concerned. Thus, this millennium-long span has been the guide-line for the general chronology of the Harappa culture, despite some feeble doubts raised during recent years. Fairservis (1961, 28), having doubted the proposed life of thousand years, pleads that "flood - caused destruction and rebuilding could have taken place in 25 years as well as in 250....However, I am not convinced that the Harappan of Sind at least represents an occupation by that culture of anything close to the thousand-year span which is accepted at present...I would expect that it was nearer 500 years."

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* Now he places it between 2500—1700 B. C. (Wheeler, 1966).

Almost similar conclusion was drawn by Buchanan (1967). According to him, as the earliest seals and imports are not earlier than the late Agade period, the Mesopotamian evidence does not require a date for the mature Indus Civilization much, if at all, before the twenty-third century B. C."....It would be surprising if it lasted more than 300 years."

Dales (1965, 274) places the mature Harappa culture in Phase F. He has attempted to establish a sound chronological framework for the cultures of the Indo-Iranian Borderlands and the allied regions on the basis of the internal evidence and correlation of total assemblages of archaeological materials. The materials are presented in terms of a succession of "phases". The phases refer to cultural horizons consisting of distinctive material assemblages and representing specific levels of cultural, social, and economic development. Divisions between phases have been determined by major changes throughout the total assemblages. He observes six successive phases, A to F. Phase F is the last one from the bottom upward, the early part of which includes the period of the "mature Indus (Harappa) civilization as we know it from Mohenjodaro, Harappa, and Chanhudaro" (Dales, 1965,274). The latter part of Phase F corresponds with the Late Harappan period —the period of decline.

Phase E provides the final stages of development that lead to the establishment of the large urban settlements in the Indus valley. The important sites included in this phase are, from west to east, Mundigak IV, 1 to 3, (Afghanistan); Damb Sadaat II and III (Quetta area), Sur Jangal III, Rana Ghundai III (Zhob Loralai), late levels of Nal, Kulli (all in Baluchistan); Amri (intermediate period), Late Phase (?)

of Kot Dijian, Early Phase (?) of large Indus sites (all in the Indus valley); and the "overlapped" and "antecedent" phases of Kalibangan (Western India). During this phase the presence of proto-Harappan elements has been noticed at many of the sites from Afghanistan to the Indus valley. Here it may be of interest to point out that some of the sites included in Phase E, described as proto-Harappan, have witnessed artifacts of mature Harappan tradition. Of these the thumbnail incised pottery, perforated vessels and bird figurines, discovered in the context of Damb Sadaat II-III, pottery traps or cages for small animals from Mundigak IV-1, and a sculptured stone male head—stylistically closely related to the Mohenjodaro sculpture—from Mundigak IV-3, are noteworthy. Besides, the incised bowl in a Damb Sadaat III level and a sherd with a few Harappan letters at site K_1, recorded by Fairservis (Ghosh, 1965, 118), may also be noted. It is significant to note in this connexion that any developmental history of these finds at their respective sites is lacking.

The placing of the Kulli culture in Phase E also does not seem to be based on sound footing. The position of the Kulli culture in relation to the mature Harappa culture of the Indus valley is still a matter of controversy. Piggott (1950) treated the two to be contemporary. Gordon (1958, 52) considered the Harappan-like pottery shapes found in the Kulli contexts to be actual imports from the Indus valley. Wheeler (1960, 13) has rightly raised the question whether the Harappan motifs at Kulli are due to direct interaction or are in a true sense antecedent and proto-Harappan. We find ourselves involved in almost similar controversy regarding the reported finds of the Harappan tradition (mentioned above) at Damb Sadaat II-III and Mundigak IV. The problem is complex. Dales (1965, 268) has pertinently observed that Phase E "is a complex phase throughout our area, and the developmental picture is anything but clear". However, Damb Sadaat II-III, Mundigak IV and other sites, included in Phase E, are well within the Harappan orbit.

Phase D* may broadly be described as pre-Harappan. It has been discussed here in detail in Appendix A. However, it may be noted that sites of Phase D with radiocarbon dates include Mundigak III (Afghanistan), Damb Sadaat I (Baluchistan), Amri (pre-intermediate phases), and the early phase of Kot Diji (Indus valley).

Regarding the probable direction of dffiusion of the early cultures of the Indo-Iranian Borderlands and the allied regions, he observes that "the phase descriptions show that many elements of the early assemblages—down to our Phase E—appear first in Afghanistan and subsequently spread through Baluchistan to the Indus Valley" (Dales, 1965, 258). From the point of view of clarity he clearly mentions that "the horizontal lines dividing the phases in the chronological chart are for convenience only. To be more accurate they should slant upward to reflect the 'sloping horizon' of cultural level from west to east" (Dales, 1965, 258). But the available radiocarbon dates, as we will presently see, suggest just a reverse pattern.

Fairservis (1967) in his recent stimulating paper captioned as "The Origin, Character, and Decline of an Early Civilization", has observed five major stages (I to V) of development in the early cultures of the Indo-Iranian Borderlands. In this paper he has utilised almost all the 'newer archaeological record' and has examined it in a new perspective. After a thorough scrutiny he has placed the mature phase of the Harappa culture in Stage IV, the last but one, which has been labelled as the stage of urbanisation. The important sites included in Stage IV are Mundigak IV (southern Afghanistan); Damb Sadaat III, Rana

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* The three early Phases—A, B and C—have no direct bearing on our problem.

Ghundai III-IV, Kulli-Harappan levels (Baluchistan); Mohenjodaro, Chanhudaro, Kot Diji (Sind) etc. He assigns dates from 2300 B. C. to 1700 B. C. for Stage IV in the Indo-Iranian Borderlands.

The characteristic feature of this stage was a monumental building situated on the highest part of a mound or other elevation, natural or artificial, usually surrounded by a wall, and a well or drain at the highest point of the structure. "Pedestaled figurines of goggle-eyed women with prominent breasts and wearing heavy necklaces, and painted figurines representing cattle, are typical" of the stage. Dead were buried in cemeteries. Pottery becomes heavier and stylized. Among other artifacts which were common in this stage as in the earlier one, mention may be made of clay bangles, beads in lapis lazuli, carnelian, steatite, and other stones, clay and steatite seals, copper and bronze implements, alabaster vessels, ground stone, flake-blade tools, bone and ivory ornaments etc.

He suggests that the "massive urban developments at Mohenjo-daro, Judeirjo-daro, Chanhu-daro, and, later, at Harappa manifestly belong to the same developmental line as that found in eastern Baluchistan and southern Afghanistan". It cannot be said that the origin of the 'Harappan civilization' is in any way divorced from the obvious line of development in Baluchistan and Afghanistan. On the basis of the present evidence it seems to have "stemmed from the developing village complex characteristic of much of Iran in the third millennium before Christ". Although, advocating for the liberation of the Harappa culture from any generic or ideological obligation to Mesopotamia, he at the same time hinges it with Iran.

The preceding Stage III is characterized by fully developed sedentary village life, regionalization with interregional contacts. This stage may be labelled as

'Early Harappan'. Among the important sites included in Stage III are Mundigak III, Damb Sadaat II, Sur Jangal III, Rana Ghundai III, Anjira IV, Amri, Mohenjodaro, Kot Diji, Sothi, Kalibangan etc. (the phases of last five sites are not clearly indicated). This stage has been dated from about 2500 B. C. to perhaps 2300-2200 B. C.

The Stage II,* second from the bottom, witnesses developed cultivation and pastoralism, and is marked by the beginning of regionalization. This stage may be described as pre-Harappan. The noteworthy sites of Stage II are Mundigak I (late phases), and Mundigak II; Kili Gul Mohammad III–IV, Damb Sadaat I, Rana Ghundai Ib-II and Sur Jangal I-II, Anjira II-III etc. The Stage II dates from c. 3300 B. C. to c. 2500 B. C.

The foregoing brief survey of the "newer archaeological record" of the Indo-Iranian Borderlands and the allied regions, as presented by Dales (1965) and Fairservis (1967), indicates that not only the sensitive aspects of the problems are still hazy, but the broad correlations of different cultural levels of the "area" are also shaky. It is evident from the facts that these two scholars actively engaged in researches of continental archaeology substantially differ from each other even on the question of general framework of cultural levels. For examples Mundigak IV (1 to 3), and Damb Sadaat II and III have been placed by Dales (1965, 278-79) in one frame, while Fairservis (1967, 15) correlates only Damb Sadaat III with Mundigak IV. Again, according to Dales (1965, 278-79), Mundigak III (1 to 6) culturally corresponds to Damb Sadaat I and Kili Gul Mohammad IV, but Fairservis (1967, 11) equates Mundigak III with Damb Sadaat II. Similarly Mundigak I (1 to 6) and part of II have been paralleled with Kili Gul Mohammad II and III by Dales (1965, 278-79), while the late phase of Mundigak I and Mundigak II have been equated with Kili Gul Mohammad III-IV and Damb Sadaat I by Fairservis (1967, 9). Dales does not find at Mundigak anything equivalent to that of Kili Gul Mohammad I, while Fairservis (1967, 6) places the early phase of Mundigak I and Kili Gul Mohammad I and II in one frame.

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* The Stage I, the earliest one, has no direct bearing on our problem.

Besides this initial question of correlations of various cultural levels, their interpretations and methodology used in deriving conclusions for some of these cultural horizons are also not free from serious controversies. For instance Dales (1965, 260) observes: "The Quetta sequence as presented by the excavator is based on a quantitative analysis of ceramic finds—a type of analysis adopted from the New World archaeological studies of mainly one-period sites that yield only ceramic materials. Basically, the analysis as offered by Fairservis is founded on the statistical maximal occurrences of pottery types. These occurrences are plotted on graphs and the successive cultural periods designated by brackets that encompass what appear to be the major ceramic horizons. The period descriptions are then compiled, including the other non-ceramic finds associated with levels falling within each period bracket. It is these Quetta period designations that have conditioned the chronological terminology of Baluchistan in recent years". But he (Dales 1965, 260) has derived quite a different period structure for Baluchistan from the same material using the following criteria : (1) initial appearance of ceramic types as opposed to maximal occurrences, (2) relative time-distribution of all types of excavated materials rather than only ceramics, and (3) period-divisions based on the distribution of the total assemblage. A major change which was noticed is that the "KGM-II period, supposedly characterized by crude handmade and basket marked pottery, does not exist as a separate entity. The published graphs show twelve different pottery types occurring within the KGM-II range ; of these, ten are wheel-made" (Dales 1965, 260-261).

Reacting to the above observations, Fairservis (1967, 17-19) points out : "These objections stem from a misunderstanding of the reasons for our using the technique......Until methodologies are used in sub-continental archaeology that recognize the dynamics of culture history rather than history *per se*, we will be playing at the philately,......the overuse of floor levels, walls, gates, hearths, and other architectural features as evidence of catastrophe, excellence, hierarchy, political event, or, indeed, the bounds of chronology, or cultural style, is now retarding sub-continental archaeology as much as did sea-level stratigraphy in pre-Wheeler days......Cultural change is not simply a matter of fallen walls and the appearance of polychrome pottery;... ...Merely finding material in stratigraphic context and describing it are not enough......Our archaeological stratigies should be accompanied by a little wisdom and much care". The reaction undoubtedly makes much sense, but the priority of stratigraphical context and the consideration of total assemblage over the analysis based on maximal occurrence' of solo-artifact, as pointed out by Dales, particularly when the materials are derived from a limited area of dig, remain no less sensible.

The controversy over methodology is not all which makes the picture of cultural developments and chronological framework of this area shaky. The untenable interpretations of some sensitive finds at some of the sites of the Indo-Iranian Borderlands and the allied regions are also responsible for it to a considerable extent. The relationships of Harappan motifs found at Kulli with the Harappa culture are supposed to be still unsettled. The interpretations available so far for the finds having Harappan motifs, discovered in the context of Damb Sadaat II-III in Baluchistan and at Mundigak IV in Afghanistan, are also not conclusive. The question whether they are in true sense antecedent and proto-Harappan or are indications of the arrival of Harappan traditions from their epicentre-sites is still open for discussion. The mode of their arrival is a still more intriguing problem. Do they indicate trade contact or actual movement of Harappan tradition ? Of course, the materials available are extremely limited, however, the balance of probability lies in favour of the latter, if they are judged from the point of view of the nature of materials.

From the foregoing discussion it appears that the cultural equations formulated for the Indo-Iranian Borderlands in the light of "newer archaeological record" which itself is shaky and unsteady, are not much conclusive to warrant any substantial modification in the chronology of the Harappa culture* as postulated by Wheeler.

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*Taking into consideration, first, that the bulk of the archaeological evidence comes from the older excavations when scientific stratigraphy was not developed, and, secondly, that objects with even vague Indian affinities have generally been lumped together for dating the Harappa culture. Agrawal (1968b, 91-99) made a bold attempt to reassess the entire evidence at length. He examined it under the pre-Sargonid, the Sargonid and the Isin-Larsa, and the post-Larsa periods, and concluded that the evidence of the first and the last periods is not of much datable value. The only reliable contacts are, according to him, confined to the Sargonid and the Isin-Larsa levels, which in no way permit us to push the beginning of the Harappa culture beyond c. 2350 B. C. But we fail to understand why the date of trade contact should be used in determining the date for the beginning of a particular culture. It could have been of some value, indeed, had the type-sequence of datable materials been available But unfortunately no type-sequence of the seals of the Harappa civilization has yet been detected (Wheeler, 1947, 78). Under the circumstances, even if the evidence of the pre-Sargonid and the post-Larsa periods is not reliable, the reliable evidence, as pointed out above, can at the most indicate that during the Sargonid period Harappa had trade contact with Mesopotomia. No sound logic, in any way, permits us to ascertain mainly on this ground the beginning of the Harappa culture as such.

Now in the following pages we will examine the radiocarbon evidence available for the Harappa culture. At the outset it must be mentioned that we have no radiocarbon date for the Early Phase of the Central Harappa However, a few dates are, of course, available for its Late Phase, and we have a fairly large number of C^{14} dates for the Peripheral Harappan sites. We propose to examine these dates under two heads—"Central Harappa" and "Peripheral Harappa". The Peripheral Harappan sites have further been divided into two, viz., "Eastern Sector" and "Western Sector". On the basis of results derived from our evidence pertaining to these two peripheral sectors, a probable date for the Early phase of the Central Harappa Culture has been extrapolated.

C^{14} DATES SCRUTINIZED

Central Harappa

For the Central Harappa there is only one site which provides radiocarbon dates. It is Mohenjodaro, and all its dates belong to the Late Phase. It may be pointed out clearly that we have no date for the Early Phase of the Central Harappa.

Mohenjo-daro (Lat. 27° 19′ N., Long. 68° 8′ E.)

There are in all seven dates—TF. 75, 1755 ± 115 B.C. (Agrawal, 1964a, 40) ; P-1182 A, 1865 ± 65 B.C.; P-1178A, 1965 ± 60 B. C. ; P-1180, 1995 ± 65 B. C. ; P-1179, 2085 ± 65 B. C. ; P-1176, 1965 ± 60 B. C. ; and P-1177, 2155 ± 65 B. C. (Stuckenrath, 1967, 333)*. TF. 75 was collected during the course of excavations carried out at Mohenjodaro in the early twenties of the century (Lal, 1963, 213). However, it is reported to have belonged to a late date

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* Measurements based on half-life value of 5730 years have been quoted from Agrawal, 1968b, Table 1.

(Marshal, 1931). The remaining six samples are from Dale's excavations carried out at the "west edge of HR area." These samples were collected from the uppermost 5 to 10 feet of the area which was excavated (Dales. 1971). Of these six, the four —P-1182A, P-1178A, P-1180 and P-1179—are derived from level 4 and belong to one and the same locus (Area VI, 9). The sample P-1176 is also from level 4 but of a different locus (Area VII, 4). The last one (P-1177) is derived from level 4a (Area VII. 3).

TABLE 9

Carbon-14 Dates and Corresponding

Stratigraphic Sequence

Index	Locus	Level	Arch. Date	C^{14} Date
TF. 75	—	—	Late Phase	1755±115
P-1182A	Area VI, 9	4	Late Phase	1865±65
P-1178A	Area VI, 9	4	Late Phase	1965±60
P-1180	Area VI, 9	4	Late Phase	1995±65
P-1179	Area VI, 9	4	Late Phase	2085±65
P-1176	Area VII, 4	4	Late Phase	1965±60
P-1177	Area VII, 3	4a	Late Phase	2155±65

Regarding TF. 75 Agrawal (1968b, 118) feels that it may not be authentic, since it was not collected specifically for C^{14} dating. We also propose to omit it for the time being but would examine it later in relation to the result deduced from more authentic samples.

Of the remaining six dates it may be mentioned at the outset that they should not be treated in lump because they represent two different levels 4 and 4a. In clarification about the archaeological relationships between 4 and 4a Dales (1971) has communicated to the author that there was a "distinction between two floor levels." All the dates for level 4 are of the

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same value within one standard deviation except the two, P-1182A and P-1179. On compounding the error of the remaining three, P-1178A, P-1180 and P-1176, the date reads 1974±35 B. C or c. 1975 B. C. P-1179 and P-1182A reading 2085±65 and 1865±65 B. C. respectively substantially deviate from those dates which are of the same values and represent the identical levels. As such, the divergent dates may be excluded. The last one, P-1177, belongs to a slightly earlier level i e., 4a. It reads 2155±65 B.C. which is fairly consistent with the date for the immediately higher level i.e., 4. Of course, the difference between the dates for the two consecutive levels, 4 and 4a, is not quite reasonable; however, the date for level 4, based on the result of three samples, remains fully valid.

While determining a date for the end of the Central Harappa Culture at the site, it must be noted that we have dates only for the two particular levels of its late phase. The obtained dependable dates, 1975 B. C. and 2155 B. C., measure the levels 4 and 4a only, not the entire phase. We have at least three more levels above the level 4 as the stratigraphy indicates. Considering the difference in point of time between the levels 4 and 4a which is of about 180 years (2155 – 1975 = 180), if we provide 150 years only to the remaining three levels on a very conservative estimate, the end of Harappa would approximately measure around 1800 B.C. (1975 – 150 = 1825.). It is interesting to observe that the result deduced from the more authentic samples is not far from the date of the sample TF. 75 (1755±115 B. C) collected several years back. In case it belongs to the uppermost level, the end of the Harappa culture may be estimated at c. 1750 B. C. on central value. But within one standard deviation it would measure c. 1650 B. C. (1755 – 115 = 1640) * or round about 1700 B.C.

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*Incidentally, it may be observed that on the basis of the date for level 4a reading 2155±65 B.C. (P-1177) which is consistent with the dates for the younger level, 4, the Late Phase of the Harappa culture itself would range from c. 2100 to 1700 B.C. with a span of about 400 years.

Peripheral Harappa

Eastern Sector

The Eastern Sector of the Peripheral Harappa includes the region lying to the east of the river Indus and its tributaries demarcated roughly by Rupar at the north, Alamgirpur at the east and Bhagatrav at the south. The region of the Central Harappa, lying along the river Indus and its tributaries, functions as an axis which divides the irregular orb of the Harappa complex into two halves. The orientation of the axis may roughly be described as from north-east to south-west. For the eastern half sector, we have only three sites of the Harappa Culture which provide radiocarbon dates. These are Kalibangan, Lothal and Rojdi. Kalibangan is nearest to the axis among all the three sites having C^{14} dates. Lothal stands at the farthest from it. In the present context Kalibangan and Lothal may, thus, he labelled as the north-westernmost and the south-easternmost sites respectively among the dated sites of the Eastern Sector of the Peripheral Harappa.

Kalibangan (Lat. 29° 25′ N., Long. 74° 05′E.)

At Kalibangan the Harappan deposit is designated as Period II. It provides twenty dates, perhaps the largest number for any single deposit so far dated. These are TF. 160, 2230±105 B. C. (Agrawal, 1965b, 291) ; TF. 607, 2090±125 B. C.; TF. 163, 2080±105 B. C.; TF. 608, 2075±110 B. C. (Agrawal, 1968a, 96) ; TF. 145, 2060±105 B. C. ; TF. 147, 2030±105 B. C. ; TF. 151, 1960±105 B. C. ; TF. 139, 1930±105 B. C. (Agrawal, 1964b, 266) ; TF. 141, 1860±115 B. C. ; TF. 142, 1790±105 B. C. ; TF. 152, 1770±90 B. C. (Agrawal, 1968a, 96) ; TF. 25, 2090±115 B. C. (Kusumgar, 1963, 141) ; TF. 153, 2075±110 B. C. (Agrawal, 1968a, 96) ; P-481, 2050±75 B. C. (Stuckenrath, 1963, 82) ; TF. 605, 1975±110 B. C. (Agrawal, 1968a, 96) ; TF. 150, 1900±105 B. C. (Agrawal, 1964b, 266) ; TF. 149, 1830±145 B. C.

TF. 143, 1665±110 B. C. ; TF. 244, 1390±95 B. C. ; and TF. 138 ; 1215±105 B. C. (Agrawal, 1968a, 96).

The first four dates belong to the Early Phase, the next seven to the Mid Phase and the remaining nine to the Late Phase. The last three samples (TF. 143, TF. 244 and TF. 138) of the Late Phase derived from near the surface are contaminated (Agrawal, 19 8b, 118). Now we have only seventeen dates to examine.

TABLE 10

Carbon-14 Dates and Corresponding Archaeological Sequence*

Index	Arch. Sequence	C^{14} Dates
TF. 149	Late Phase Period II	1830±145
TF, 150	,, ,, ,,	1900±105
TF. 605	,, ,, ,,	1975±110
P—481	,, ,, ,,	2050±75
TF. 153	,, ,, ,,	2075±110
TF. 25	,, ,, ,,	2090±115
TF. 152	Mid Phase, Period II	1770±90
TF. 142	,, ,, ,,	1790±105
TF. 141	,, ,, ,,	1860±115
TF. 139	,, ,, ,,	1930±105
TF. 151	,, ,, ,,	1960±105
TF. 147	Lower Mid Phase, Period II	2030±105
TF. 145	,, ,, ,,	2060±105
TF. 608	Early Phase, Period II	2075±110
TF. 163	,, ,, ,,	2080±105
TF. 607	,, ,, ,,	2090±125
TF. 160	,, ,, ,,	2230±105

* Information regarding the sequence of layers for the dates are not reported. Hence they have been plotted only phase-wise.

The first three dates (TF. 608, TF. 163, TF. 607) of the Early Phase are of the same value. The mean of these reads 2081 ± 64 B. C. or c. 2100 B. C. The remaining date (TF. 160) is older by 149 years than the mean obtained for the above three dates. Besides, it may also be noted that the difference of the two is 'real' with maximum level of confidence, indicating thereby an independent unit. If it (TF. 160) belongs to a comparatively older layer (exact information not available), the results are obviously consistent (cf. TF. 160 with the mean of TF. 608, TF. 163 and TF. 607). Thus, within one standard deviation c. 2300 B. C. (TF. 160, 2230 + 105 = 2335) appears to be the available lower bracket (not the lowest) for the Early Phase at the site.

Among seven dates of the Mid Phase of Period II, the last two (TF. 147 and T.F. 145) are reported to be for its lower level. The sub-levels of the remaining five are not available. However, if they belong to the upper level of the Mid Phase, the dates are then fully consistent with the corresponding archaeological sequence, because the two dates of the lower Mid Phase are older than the rest. It may further be noted that these dates are consistent not only within the range of their own phase (Mid Phase), but also with the dates of the Early Phase. The two dates TF. 147 and TF. 145 of the lower Mid Phase are same within one standard deviation. The mean of the two reading 2045 ± 74 B. C or c. 2100 B. C. (within one standard deviation) dates the lower limit of the Mid Phase of Period II. TF. 152 (1770 ± 90 or c. 1800 B. C.), the youngest of its upper level (?) may date the upper limit of the Mid Phase.

For the Late Phase we have six dates. In the absence of correlated stratigraphic data it is difficult to assess the position of their internal consistency. However, broadly they range between c. 2100—1800 B. C. These dates may or may not be consistent with the corresponding stratigraphic sequence within the phase

(Late Phase) itself, but it is quite obvious that its broad time-bracket (c 2100—1800 B C.) does not fit even crudely in the c ronological frame based on C^{14} evidence at the site. Its time-bracket is exactly the same as that of the time-bracket of the Mid Phase (cf. the two sets illustrated in Table 10). It appears, thus, that the samples of the Late Phase were either contaminated or the identification of archaeological level iteslf was far from right.

Whatever may be the case but under present circumstances it is not proper to use the dates of the Late Phase for determining the upper date-limit of the Harappa culture at the site. It may, however, tentatively be worked out on the basis of extension limit. The youngest date for the Mid Phase of Period II reads 1770 ± 90 or c. 1800 B. C. (TF. 152). Now, if we assign even 100 years to the deposits of its Late Phase, which is not unreasonable in the light of the spread obtained for the Mid (300 years) and the Early (200 years) phases, the upper limit would read around 1700 B. C. In view of the above observations the Harappan deposits may be dated from c. 2300 to 1700 B. C. at the site with a span of about 600 years.

Lothal (Lat. 22° 31′ N., Long. 72° 15′E.)

The occupational strata at Lothal are divisible into two periods, A and B, representing respectively the Harappa and the post-Harappa cultures. On the basis of the structural remains, Period A (Harappa culture) is further divisible into four Phases, numbered I to IV from bottom upwards. Of these again, Phase II has three sub-phases, A,B and C, and Phases III and IV have each two sub phases, A and B. Period B. (post-Harappa) numbered Phase V has two sub-phases, A and B.

For the Harappa culture we have seven dates—TF. 136, 2080 ± 135 B. C. ; TF. 135, 1555 ± 130 B. C.; TF. 133, 1895 ± 115 B. C. (Agrawal, 1964b, 266); TF. 22, 2010 ± 115 B. C. ; TF. 27, 2000 ± 115 B. C. ; TF. 26, 2000±125 B. C.; and TF. 29, 1895±115 B. C. (Kusumgar, 1963, 141). For the immediately post-Harapan deposits we have two dates, TF. 23, 1865±110 B. C.; and TF. 19, 1800±140 B. C. (Kusumgar, 1963, 141). The first three dates (TF 136, TF. 135 and TF. 133) belong to the late level of Phase I, the early level of Phase II and the late level of Phase II respectively. The three subsequent dates (TF. 22, TF. 27, TF. 26) belong to the late level of Phase III. The next one (TF. 29) is for the early level of Phase IV. The last two dates, TF. 23 and TF. 19, of the post-Harappan deposits belong to the early level of Phase V.

TABLE 11

Carbon-14 Dates and Corresponding Archaeological Sequence

Index	Arch. Sequence	C^{14} Date	Remark
TF. 19	Early level of Phase V, Period B or II	1800±140	Post-Harappa
TF. 23	,, ,,	1865±110	
TF. 29	Early level of Phase IV, Period A or I	1895±115	Harappa Culture
TF. 26	Late level of Phase III, Period A or I	2000±125	
TF. 27	,, ,,	2000±115	
TF. 22	,, ,,	2010±115	
TF. 133	Late level of Phase II, Period A or I	1895±115	
TF. 135	Early level of Phase II, Period A or I	1555±130	
TF. 136	Late level of Phase I, Period A or I	2080±135	

Dates (TF. 19 and TF. 23) for the early level of the post-Harappan deposits are of the same value within the range of counting error. The mean of the two reads 1840 ± 86 or c. 1800 B. C Again, all the three dates (TF. 26, TF. 27 and TF. 22) for the late level of Phase III are also the same (c. 2000 B. C.). Both dates (TF. 133 and TF. 135) of Phase II seem to be a case either of contamination or of scatter, since they are younger than the dates of the succeeding level (Phase III). Besides, they are also inconsistent among themselves because the late level (TF. 133, 1895 ± 115 B.C.) is older than the early level (TF. 135, 1555 ± 130 B. C.). Hence, these two dates have been excluded. Now, all the dates of Phase III, IV and V are fully consistent with their corresponding archaeological sequence. They gradually read younger while we proceed upward from phase III. For Phase I we have only one date (TF. 136, 2080 ± 135 B. C.). It is fully consistent with the dates of its succeeding levels and phases (except Phase II).

Thus, within one standard deviation c. 2200 B. C. (TF. 136, 2080 + 135 = 2215) appears to be the lower limit (not the lowest as the samples in question is from the late level of Phase I) of the Harappa culture at the site. Its upper limit may tentatively be represented by the mean of two dates (TF. 19, TF. 23) available for the early level of Phase V which reads 1840 ± 86 B. C. or c. 1800 B. C.

Rojdi (Lat. 21° 51′ N. Long. 70° 54′ E.)

The Harappan occupation at Rojdi, designated as Period I, is divisible into three Phases A, B and C. Allchin considers Phase B as post-Harappan and equates it with Lothal II or Lothal B (Allchin, 1968, 180). There is no C^{14} date for the Phase A. However. two C^{14} dates (TF. 200 and TF. 199) are available for the Phase B. They read 1970 ± 115 B. C. and 1745 ± 105 B. C. (Agrawal, 1964 b, 266) respectively. The samples of these dates have been derived from layer 3 and Pit 2 sealed by layer 4 respectively, but it may be pointed out that they are from different trenches. No clear information is reported about the position of the correlated stratigraphy. However, both of them belong to one and the same Phase IB.

If TF. 199 belongs to an older stratum (Pit 2 SB layer 4) than TF. 200 (layer 3), as it apparently appears, the results are then not consistent with their corresponding stratigraphy, because the date of the lower stratum (1745 ± 105 B. C) is younger than that of the upper one (1970 ± 115 B. C.). It may also be pointed out that the difference of the two, which comes to about 225 years, is also 'real' with 95% level of confidence. Because while adding two standard deviations on the younger date and one on the older, the younger still remains younger. Even if the sratigraphy is reversed, the span of 225 years for the two consecutive layers does not seem reasonable and hence the doubt about the validity of both dates.

Western Sector

We propose to consider under the Western Sector of the Peripheral Harappa, the sites having Harappan settlements or having Harappan affinities in the Indo-Iranian Borderlands situated to the west of the Indus valley, where the genesis of the Harappa culture is being searched. The sector mainly includes Baluchistan and Afghanistan. We have no radiocorbon dates from any of the sites of the true Harappa culture in this sector. However, we have a few C^{14} dates for the horizons from where the artifacts of the true Harappan traditions have been discovered in a well stratified context. These are Damb Sadaat II and III, Mundigak IV has also yielded artifacts of the Harappan motifs. Mundigak IV has, of course, no direct evidence of radiocarbon dates, however it may be mentioned that C^{14} dates are available for Mundigak III-5 which is separated from the early level of Period IV only by one structural-phase, i. e. III-6. The date of III-5 may provisionally be used for dating at least the lower level of Period IV on extension limit.

The dates of Damb Sadaat and Mundigak are highly significant, because they determine the arrival of the Harappan traditions in Baluchistan and Afghanistan, which may be helpful in ascertaining the probable direction of the movement of the Harappan traditions. Besides, they may also help in extrapolating the probable date for the Early Phase of the Harappa culture in the central region.

Damb Saddt

At Damb Sadaat Periods II and III have witnessed artifacts of Harappan traditions. For these deposits five C^{14} dates are available. These are UW-60 (Fairhall, 1966, 498); P-523 (Stuckenrath, 1963, 82); L-180 E, L-180 C (Broecker, 1956, 154); and P-522 (Stuckenrath, 1963, 82). They read* 2140±165 B. C, 2200 ±76 B. C., 2425±361 B. C., 2425±412 B. C., and 2559±202 B. C. respectively. UW-60 belongs to Period III, and the rest four dates are for Period II.

TABLE 12

Carbon-14 Dates and Corresponding Archaeological Sequence

Index	Arch. Pd.	C^{14} Date	Remark
UW-60	DS-III	2140±165	—
P-523	DS-II	2200±76	—
L-180 C	DS-II	2425±412	—
L-180 E	DS-II	2425±361	Sample was collected 3 m. below L-180C
P-522	DS-II	2559±202	—

*All measurements, except of UW-60, calculated on the half-life of 5730±40 years have been quoted from Dales (1965, 276). He has added further 200 years to the dates of samples Nos. L-180 E and L-180 C in order to correct the Suess effect on old solid carbon samples as per information from radiocarbon laboratory of the University of Pennsylvania. To avoid confusion it may be noted that Lal (1963) and Agrawal (1968b) have not added this 200-year factor on the above two dates.

In the absence of adequate archaeological informations it is not possible to examine the consistency of all the available dates within the period) with the corresponding stratigraphic sequence. However, the position of the consistency with period-sequence may be examined. The measurements of samples L-180 C and L-180 E reading 2425 ± 412 B. C. and 2425 ± 361 B. C. respectively are identical, which evidently should not have been the case, for the sample L-180 E "was collected 3 m. below L-180 C and was separated from it by at least two floor levels" (Broecker, 1956, 160). Stratigraphically the sample L-180 E belongs to a considerably earlier level than that of L-180 C, but their determinations do not correspond to the stratigraphic sequence at the site. In view of this these two dates are not dependable. The remaining two dates 2559 ± 202 B. C. (P-522) and 2140 ± 165 B. C. (UW-60) belonging to Damb Sadaat II and Damb Sadaat III respectively, are fairly consistent. On the basis of these two valid dates Damb Sadaat II and III may provisionally be dated from c. 2500 to c. 2100 B. C.

Mundigak

There are no C^{14} dates for Mundigak IV which has yielded artifacts of Harappan traditions. However, we have two C^{14} dates for Mundigak III, the immediately preceding period at the site. These are GSY-51 and GSY-53 which read 1135 ± 118 B. C. and 2360 ± 115 B. C. (Allchin, 1968, 337) respectively. The former (GSY-51) belongs to Phase I of Period III. The latter (GSY-53) represents the last but one phase, i.e. Phase 5 of the same period. It may be pointed out here even at the risk of repetition that the early level of Mundigak IV is separated from Mundigak III only by one phase, i.e. III-6. Under the circumstances, the date of Period III-5, if found valid, may tentatively be used for dating at least the early level of Period IV after allowing a reasonable duration to the intervening phase.

In order to ascertain the validity of these two dates of Period III we have examined* them in the context of other dates available for the preceding periods at the site. As a result it was found that on the basis of valid C^{14} date for Period III-5, reading 2360 ± 115 B. C., the early level of Period IV cannot be dated earlier than at least c. 2300 B. C. Considering the archaeological span of Period IV, its upper limit may provisionally be fixed around 2200/2100 B. C. at the maximum. Period IV at Mundigak may, thus, be dated from c. 2300 to 2200/2100 B. C.

FINDINGS

Central Harappa

We have no C^{14} dates for the Early Phase of the Central Harappa Culture. For its Late Phase Mohenjodaro alone furnishes C^{14} evidence. There are in all, as mentioned above, seven dates of which six are from Dales's excavations. These six dates belong to two distinct floor levels, 4 and 4a. Archaeologically, the level 4a is earlier than the level 4, and significantly enough, the C^{14} date of the former level is also older by 160 years than the oldest among the valid dates available for the latter one, confirming thus the existence of two distinct levels. In his recent work Agrawal (1968 b, 118), the author of the famous 'Shorter Chronology', having amalgamated the dates of the younger level (4) with the older one (4a), and on the basis of their mean, has strongly pleaded for a fairly early end, i.e. 2000 B. C., of the Harappa culture in its central region. This hypothesis, as we will presently see, suffers from such shortcomings as not only make his conclusion doubtful but also give rise to some problems pertaining to the application of radiocarbon dates in archaeology.

The first problem relates to the propriety of applying the mean of C^{14} dates belonging to different levels or layers in determining an archaeological event, espe-

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*For the details of examination see *infra,* Appendix A.

cially when the date-differences of the levels or layers in question are considerable. In the present instance, as noted above, the relevant C^{14} dates the mean of which has been used, belong to two distinct levels—4 and 4a; and the difference of the two is also sizable. The next problem which needs attention in this context is, how far it is justified to assign a time-limit to any archaeological phase simply on the basis of the dates for the intervening layers or levels. Archaeologically, a *phase* does not denote a single level; it is in fact a term connoting a *range* comprising a series of levels or layers, each representing a separate duration. As such, only the uppermost layer or level, as the case may be, and none else, can provide the upper date-limit to a phase. Any upper time-limit fixed on the basis of a date or dates belonging to the intervening layers or levels would be nothing but erroneous.

In the case of the dates for the Late Phase at Mohenjodaro, it may be pointed out that they belong to particular levels, 4 and 4a. The dates of these levels can date only these two, not the entire phase. It is evident that the level 4 does not represent the uppermost level the date of which alone would be qualified to furnish the evidence for dating the end of that phase at the site. Under the circumstances, it is highly improper to postulate that the Harappa culture in its central region ended with either the date as provided by the level 4 or the mean of the dates of levels 4 and 4 a.

In view of the most conservative dating for the succeeding three levels (1 to 3), and the level-wise consideration of all the available dates, the end of the Harappa culture in the central region, as discussed above, seems to be round about 1700 B. C.

For the beginning of the Central Harappa Culture, as noted earlier, we do no thave any direct C^{14} evidence. Agrawal (1968b, 119), however, has attempted to extrapolate it on the basis of the dates for Damb Sadaat

II and Kot Diji I (latest level). For Damb Sadaat II there are four dates—P-523, 2200±76 B. C.; L-180 E, 2425±361 BC, L-180 C, 2425±412 BC and P-522, 2559 ±202 B.C. Three of them range from c. 2425 to 2559 B. C. the remaining one reads c. 2300 B. C. within one standard deviation. Agrawal has selected the youngest date (P-523) for determining the anterior limit of the Harappa culture only on the basis that the remaining dates have large errors. The date, P-195, 2100±140 B. C., for the end of Kot Diji I has also been used as an important evidence in fixing the beginning of the Harappa culture in its central region. Resting on these two dates, P-523 and P-195, he has strongly advocated c. 2300 B. C. as a date for the beginning of the Central Harappa Culture.

But the nature of the above application of C^{14} evidence to determining the archaeological event, again gives rise to some methodological problems. The first is connected with some aspect of the error on radiocarbon dates. While using the C^{14} dates in ascertaining the date-bracket for any culture complex, we are sometimes confronted with the problem as to what the limitation of the *range of error* is, which should not be taken as dependable. In the present case Agrawal (1968 b, 119) has considered those dates as undependable, which have errors ranging from about 200 to 400 years (see P-522, L-180E and 180C), but, curiously enough, at another place he (Agarwal, 1968b, 116) has upheld the date (L-180B, 2320±360) having error of 360 years which comes well within the above range. Needless to say that to select or reject a date or dates according to one's convenience and suitability is not in keeping with the scientific method. It should be governed by some firm principles. In fact, the range of error, which is not dependable, has got to be clearly defined and strictly adhered to in a uniform manner, while determining the archaeological event.

The second problem which requires consideration relates to the question of determining the date of a principal site of a particular culture on the basis of the dates of the allied sites The issue becomes still more delicate when the initial date of a particular culture is fixed on the basis of the terminal date of the preceding culture available at the allied sites. It is so because the C^{14} evidence has made it amply clear that the contemporaneity of sites, as judged from cultural equation, does not prove always tenable in the light of radiocarbon evidence. In this context the C^{14} evidence of Kalibangan is highly significant. Here the upper date-limit of the pre-Harappa cultures has been dated around 2000 B. C. at the maximum. But the lower date-limit of the succeeding Harappa culture at some sector of the same site is dated to c. 2300 B. C. It is obvious from the above evidence that the Harappa culture was born 300 years earlier than the demise of the pre-Harappa cultures at some sector of the same site. By implication, it is also obvious that the date for the end of the pre-Harappa cultures is not necessarily binding for determining the lower date-bracket of the Harappa culture at the site. In view of this it is difficult to explain how this or any similar evidence should be used with justification for dating a particular culture at a different site, when the terminal date of the preceding culture does not function as binding for dating the initial date of the immediately succeeding culture even at the same site.

In the light of the above evidence the attempt to determine the initial date of the Central Harappa Culture on a basis of the terminal date of the preceding culture available at Kot Diji I, is not proper.

Peripheral Harappa

At the westernmost site (Kalibangan) of the Eastern Sector of the Peripheral Harappa, the Harappa culture has been dated from c 2300 to 1700 B. C.

on the basis of valid C^{14} dates. The upper limit is extremely provisional, as the available C^{14} dates for the Late Phase at the site are not even roughly consistent. At the south-easternmost site (Lothal) of the same sector, the Harappa culture ranges from c. 2200 to 1800 B. C.

In the Western Sector of the Peripheral Harappa the horizons yielding artifacts of the Harappan traditions at Damb Sadaat II and III—the easternmost dated site of the Western Sector have been dated from c. 2500 to 2100 B. C. by the radiocarbon evidence. At the westernmost site (Mundigak IV) the level having the artifacts of the Harappan nature may be dated around c. 2300 to 2200/2100 B. C.

Now, the latitudinal plotting of these four sets of dates demonstrates that they become progressively younger from east to west in the Western Sector, and from north-west to south-east in the Eastern one. What does this phenomenon indicate ? Does it hint at the direction of the movement of the Harappan and Harappan traditions ? The available data, of course, are not sufficient enough for arriving at any positive conclusion ; however, the emergent indications cannot be brushed aside.

Lower Limit of the Central Harappa Culture

We have, as mentioned above, no C^{14} dates for the Early Phase of the Central Harappa Culture. Under the circumstances we can workout only some tentative conclusion regarding the lower limit of the Central Harappa Culture on the basis of the *trend* of movement of the Harappans and Harappan traditions, as reflected in the two peripheral sectors (Eastern and Western) and the available *oldest date* for the horizon of the Harappan affinities. In the Eastern Sector the probable trend of the movement seems to be from north-west to south-east, since at Kalibangan (the westernmost dated site of the Eastern Sector) the lower date-limit of the Harappa culture reads around 2300 B. C., while at Lothal it is dated to c. 2200 B C. Again, in the Western Sector the trend appears to have been from east to west. It is obvious, for at Damb Sadaat (Baluchistan the deposits yielding artifacts of the Harappan traditions range from c. 2500 to 2100 B. C., while at Mundigak they may be dated from c. 2300 to 2200/2100 B C. The combined trend of the two sectors makes, thus, a valid ground for treating the region of the Central Harappa as a mother-zone from where the Harappans might have moved in the above two directions. The date for the Early Phase of the Harappa culture in its mother-zone must be, if not earlier, at least co-terminous with the available *oldest date*, i.e. c. 2500 B. C. for the deposits of the Harappan affinities which are represented at Damb Sadaat II-III. But it may be cautioned that on the basis of the above date (c. 2500 B. C.) we should not postulate the beginning of the Harappa culture as such. At the most it can only indicate that the Harappa culture was in existence, and had some kind of contacts with Damb Sadaat II, on that time-plane.

Here it may be of interest to point out that even if the reported finds of the Harappan traditions at Damb Sadaat II-III and at Mundigak IV are interpreted as evidences of purely trade contacts, the general conclusion remains completely unaffected. On the assumption of trade contact the progressively younger dates from east to west would not indicate a movement. It would in that case simply mean that Damb Sadaat II-III and Mundigak IV had contacts with the Harappa culture on two different time-planes. But the trade-contact hypothesis does not, in any way, preclude us from accepting the existence of the Harappa culture in c. 2500 B. C. on the basis of the oldest C^{14} date available for the Harappan contact at Damb Sadaat II, irrespective of the nature of contact. As a matter of fact the mode of contact is not yet conclusive. If the quantity of finds is to be considered as the sole criterion to judge the nature of contact, then of course the contacts, mentioned above, were purely commercial. But if the quality of objects has also any consideration in analysing the nature of contact, the probability of cultural movement at Damb Sadaat II-III, and Mundigak IV can not be ruled out. It may be recalled that the reported finds of the Harappan affinities discovered at Damb Sadaat and Mundigak are not strictly of commercial value.

The suggestion hinted above on the ground of C^{14} evidence that the Harappan traditions seem to have moved from east to west in the Western Sector, and roughly from west to east in the Eastern one, acquires further strength in the light of historical perspective, as almost similar pattern of movement, resting again on the evidence of carbon-14 dates, is also indicated in the pre-Harappa phase. The evidence to this effect has been discussed in Appendix A*. It may, however, be mentioned here that the latitudinal plotting of the radiocarbon dates available for some of the pre-Harappan and the allied sites—Kalibangan I, Kot Diji I, Amri IB, Damb Sadaat I, Mundigak III—having evidence of cultural tie among themselves, presents almost similar pattern as emerges from the dates available for the Harappan and allied sites. The oldest among the available dates for the pre-Harappan and the allied sites is for Amri IB which reads c. 2900 B. C. (T F. 864). The dates progressively become younger while we move from Amri towards the north-east, on the one hand, and the north-west, on the other. It is obvious that at Kot Diji and Kalibangan their respective dates read c. 2700 B. C. (TF. 196, within one standard deviation) and c. 2400 B. C. (TF. 155), and again in the Western Sector at Damb Sadaat I and Mundigak III-5 they measure c. 2700 B. C. (L-180 B, within one standard

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*See *infra*

deviation) and c. 2400 B. C. (GSY-53) respectively. It may be recalled in this connexion that Dales (1965, 278-79), on the ground of cultural equations, has placed Mundigak III, Damb Sadaat I, Amri I and the early phase of Kot Diji in one frame with a comment that "the horizontal lines dividing the phases in the chronological chart are for convenience only. To be more accurate they should slant upward to reflect the 'sloping horizon' of cultural level from west to east" (Dales, 1965, 258); but, significantly enough, the plotting of the C^{14} dates for the above sites provides a some what reverse pattern.

To sum up, according to our findings, there is no ideally qualified radiocarbon evidence to fix either the terminal or the initial date of the Central Harappa Culture. The available evidence for the Late Phase can only date its intervening levels and not the uppermost one. For the Early Phase we have no direct C^{14} date. The available oldest date for the horizon of the Harappan affinities, as represented at Damb Sadaat II, only indicates the existence of the Harappa culture on that time-plane; it does not furnish evidence for dating the *beginning* as such of the Harappa culture. Under the circumstances we would not be justified in building any positive chronology based on the available C^{14} evidence for the Central Harappa Culture. However, on the basis of the emergent indications, it may tentatively be dated ranging from c. 2500 to 1700 B. C. with every possibility that its lower limit may go still earlier. The region along the Indus seems to be the mother-zone of the Harappa culture from where the Harappans and Harappan traditions might have moved from east to west in the Western Sector and roughly from west to east in the Eastern one. Almost similar pattern is indicated also in the pre-Harappan phase.

CHAPTER IV

OTHER CHALCOLITHIC CULTURES

BANAS CULTURE

Most of the explored and excavated sites of the Banas culture are confined to the south-eastern part of Rajasthan. This region is drained by the river Banas and its tributaries. Among the important sites only two, Ahar and Gilund, have been excavated.

At Ahar (IAR., 1954-55, 1955-56, 1961-62) the chalcolithic deposit designated as Period I—divisible into three Phases, IA, IB and IC—is broadly characterised by painted pottery, copper and the absence of lithic tools (but microliths are reported in earlier excavations IAR, 1954-55, 14; 1955-56, 11). The distinctive feature of Period I is the variety of ceramic fabrics. At least four distinct wares—cream-slipped, black-and red, red, and grey—have been recognised. Phase I A is represented by the cream-slipped, the buff, the coarse black-and-red, the painted black-and-red, the blotchy-grey and, the red-slipped wares. The cream slipped is rather uncommon. It has only a few shapes. The black-and-red is the most distinctive ware. It comprises a variety of bowls which are mostly decorated on one or both faces in dull white pigment with a large variety of simple linear and geometrical patterns. In the red ware the shapes comprise variety of jars, dishes, bowls and dish-on-stand. In the grey ware shapes are mostly globular jars, basins, dish-on-stand and lids. Phase IB is distinguished by the absence of the cream or buff ware and the presence of all other industries of the preceding phase. A single sherd of the Jorwe ware is also reported. Phase IC is represented by the red-washed, the painted black-on-red, the black-and-red, the coarse red, the Lusturous Red and the blotchy-grey wares.

Of the other finds mention may be made of copper objects and copper slag, animal bones, querns, pounders, incised terracotta spindle-whorls, beads of steatite, faience ,shell and semi-precious stone etc. The houses are made of stone and mud. Large-sized hearths with a unit of two or four may indicate community-cooking. Among the pieces of evidence representing foreign association the noteworthy are : the buff ware having greenish slip recalling similarity in fabric from Baluchistan and Iran; animal-headed handles simulating some features from Troy and Geoy Tepe; bowls on a broad hollow stem showing parallels at Tepe Hissar; and lastly incised terracotta spindle-whorls resembling closely those from Troy, and Anau in Central Asia.

Period II is sub-divided into three phases, designated as IIA, IIB, and IIC at the site. The deposits of Phase II A, the earliest of Period II, are characterized by the occurrence of the N. B. P. Ware, objects of *iron* and a mixture of coarse red, slipped-red, plain black-and-red, and black-painted red wares. The excavator, on the basis of some ceramic evidence, proposes to *interlock* the present culture (early Historical, Phase IIA) with that of the preceding one (Chalcolithic). We will discuss the bearing of the C^{14} evidence on the proposed *interlocking* hypothesis later on.

At Gilund (IAR, 1959-60) the chalcolithic deposit is represented by the presence of microliths, a few bits of copper and the typical painted black-and-red ware. The other ceramic industries include the plain and painted black burnished grey, and red wares. Besides, a few specimens of the black-on-cream and black-on-red wares in the upper levels, and of a polychrome ware from the lower levels are also reported. Among the noteworthy ceramic shapes are included the dish-on-stand in the red and black-on-red wares, the high-necked jar and basin with cut-spout in the red ware, the lipped basin, vase with strap-handle in the burnished grey ware etc.

Terracotta animal figurines and gamesmen; beads of terracotta, agate, chalcedony, steatite; saddle-querns and rubbers of stone are among other finds. Of the animal terracotta mention may be made of bull with prominent hump and long horns.

The structures are mostly of mud-bricks laid with mud mortar. From the early level, it may be noted, no evidence of burnt-brick is available. However, from the mid level structures of kiln-burnt brick over a stone-rubble foundation are reported.

Now about the chronology Roughly sixteen years back, when our knowledge of the black-and-red ware was very limited, the first excavator of Ahar suggested: "...as the beginning of the black-and-red ware, in Central India is dated to circa [illegible]00 B. C. or earlier we may assume that the lower culture of Ahar went back to that period" (IAR, 19 4-55, 15). The excavator of Gilund, Lal observed : "Nothing can be said in absolute terms about the chronology of the chalcolithic levels of Gilund. It may not be, however, irrelevant to attempt a correlation between Gilund and Navdatoli, as the chalcolithic levels at the latter site have already been dated by radiocarbon tests to circa 1500-1000 B. C. In the first place, the painted black-and-red ware occurs throughout the chalcolithic levels at Gilund but is stated to be confined mostly to the lowermost layers of Period III (chalcolithic) at Navdatoli. Secondly, the cream-slipped ware, bearing typical designs like the dancing-figure, spotted animal etc., in black or perplish black colour, 'is restricted to the lower levels' (of the chalcolithic period) at Navdatoli, whereas at Gilund it has been found so far in the uppermost levels only. This disposition of these two wares at the two sites would indicate that the upper levels of the chalcolithic period at Gilund may broadly be contemporary with the lower levels of the corresponding period at Navdatoli. If that is so, the chalcolithic period at Gilund may roughly be placed during the couple of centuries on either side of 1500 B. C." (IAR 1959-60, 44).

Sankalia, the next excavator of Ahar, concluded that from a comparative study of the pottery types the beginning of Period I may be dated to circa 2000 B C. (IAR, 1961-62, 45).

As regards the C^{14} based chronology, it may be noted at the outset that the data are not sufficient. We have only one site, Ahar, which provides radiocarbon dates for this culture. The details of their examination, probable determination of the time-bracket and the allied discussions are given below.

C^{14} DATES SCRUTINIZED

Ahar (Lat. 24° 35′ 9″, Long. 74° 43′8″)

We have in all nine dates for Ahar—TF 31, TF. 32, TF. 34, TF. 37 (Kusumgar, 1963, 145-46); V-57, V-56, V-54, V-58 and V-55 (Bermingham, 1966, 507). Samples of the first two dates are derived from layer 5 of the different trenches, the next two from layers 7 and 8 respectively (different trenches), and the last five from layers 7, 8, 9, 10 and 11 respectively (different trenches). The position of the correlation of these layers is not clearly indicated*. However, fortunately, their archaeological phases are available. TF. 31 and TF. 32 belong respectively to the late and the mid level of Phase IC, and TF. 34 and TF. 37 to the mid level of Phase IA (Lal, 1963, 214). For the remaining five (V-57, V-56, V-54, V-58 and V-55), the sub-levels could not be obtained*; however, they belong to Phase IA. The C^{14} dates read 1270 ± 110 B. C for TF 31; 1550 ± 110 B. C. for TF. 32; 1725 ± 140 B. C. for TF. 34; 1305 ± 115 B. C for TF. 37; 2145 ± 100 B. C. for V-57; 1875 ± 100 B. C for V-56; 2000 ± 100 B. C. for V-54; 2055 ± 105 B. C. for V-58; and 1990 ± 125 B. C. for V-55.

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*See post script B

TABLE 13

Carbon-14 Dates and Corresponding Archaeological Sequence

Index	Locus	Arch. Date	C.14 Date
TF. 31	Layer-5, Depth-1.98 m., Trench X	Late level, Phase 1C.	1270±110
TF. 32	Layer-5, Depth-4.9 m., Trench A	Mid level, Phase IC.	1550±110
TF. 34	Layer-7, Depth-11.5 m., Trench E	Mid level, Phase IA	1725±140
TF. 37	Layer-8, Depth-12.1 m., Trench-J	Mid level, Phase IA	1305±115
V.57	Layer-7, Depth-37 ft., Trench-H	IA	2145±100
V-56	Layer-8, Depth-37 ft., Trench-Y	IA	1875±100
V-54	Layer-9, Depth-37 ft., Trench-Z	IA	2000±100
V-58	Layer 10, Depth-41 ft., Trench-J	IA	2055±105
V.55	Layer-11, Depth-41. 5 ft., Trench-K	1A	1990±125

Dates of Phase IC (TF. 31 and TF. 32) are obviously consistent with their corresponding archaeological sequence, since the measurement for its mid level is older than that of the late level. The difference of

280 years, between the two appears to be 'real' with maximum level of confidence; because, while adding two standard deviations on the younger date and one on the older, the younger still remains younger. But how far is the obtained difference of 280 years for the two consecutive levels, mid and late, justified ? It is a matter to be investigated. However, as the evidence stands, the dates are fully consistent.

Dates for the mid level of Phase IA (TF. 34 and TF. 37) are not consistent among themselves, as the sample TF. 37 derived from layer 8 is younger than that derived from layer 7 (TF. 34). TF 37 is younger also in rleation to the date of the mid level of Phase IC (TF. 32). TF. 37 may, therefore, be omitted. TF. 34, however, is fully consistent with the dates of Phase IC (cf. TF. 32 and TF. 31).

The remaining dates, barring V-57 and V-55 for Phase IA, are consistent not only among themselves, but also with the other valid dates of Phase IA and IC. The available oldest valid date (V-58) for Phase IA reads 2055±105 B. C. or c. 2100 B. C.

For the determination of time-bracket of the chalcolithic deposit at the site, we have fairly reliable evidence for its lower limit. As examined above, there are as many as four valid dates (TF. 34, V-56, V-54 and V-58) for Phase IA. All of them are fully consistent with the corresponding stratigraphic sequence. Besides, they are consistent also with the dates of Phase IC. The available oldest date reading 2055 ±105 B. C or c. 2100 B. C. may, thus, safely be attributed to the lower limit. But the question of the upper limit is yet to be settled. We have two valid dates for Phase IC, but the difference of these two, representing the mid and the late levels, does not reasonably explain the spread of the two consecutive levels. However, on the basis of the available uppermost date, 1270±110 B. C. (TF. 31), the upper bracket may tentatively be dated around 1300 B. C.

FINDINGS

As the C^{14} evidence stands, the Banas culture appears to be the earliest, having longest spread among all the other Chalcolithic cultures of India. The Malwa and the Jorwe begin around 1600 B. C., and last for two and four hundred years respectively (see *infra*). But the Banas begins around 2100 B. C., and survives for 800 years, ending tentatively around 1300 B. C. While comparing the Banas culture with the Harappa, it seems almost definite, at least on date-point, that the former co-existed with both the *Central* as well as the *Peripheral* Harappa. The Banas culture was probably a mid contemporary of the Central Harappa (c. 2500—1700 B. C.), and almost an early contemporary of the Peripheral one (the Harappan in the Eastern Sector dates at Lothal from c. 2200 to 1700 B. C.).

Culturally we have nothing conclusive to demonstrate the Harappan influence on the Banasians. Sometimes the use of burnt-brick of the Harappan dimension and some other minor traits are emphasised for showing the Harappan contact. But surprisingly enough, not even a brick bat (kiln-burnt) has been found from Ahar. It, of course, comes from Gilund, but that too from the mid level (Lal in IAR, 1959-60, 43). The evidence of burnt-brick is completely absent in the early phase of Gilund. If the use of burnt bricks of the Harappan dimension is to be taken as evidence for showing the Harappan impact, then the early phase of Gilund along with the early Ahar must be considered at least different from the Harappan-influenced phase. The technological and typological analysis of the copper implements of the two also suggests that the Banas copper techno-typology was different from that of the Harappa (Agrawal, 1968 b, chap. 6). Besides, the discovery of the black-and-red ware from the earliest level of Lothal, which has so far not been found from any of the Central Harappan sites, is very significant. It might be the reminiscent of the pre-Harappan local culture of this region. In this connexion it is also significant to note that the black-and-red ware occurs in the early Lothal as well as in the Ahar-Gilund complex. It is still more significant that on the basis of the radiocarbon evidence Ahar proves to be almost an early contemporary of Lothal. Does it suggest the survival of some pre-Harappan phase at Banas ?

Sankalia (IAR, 1961-62, 47-50), however, finds in the assemblages of Banas some evidences of Baluchistan and Iranian affinities. Mention may be made of the buff ware having distinct greenish grey slip recalling a similar fabric from Baluchistan and Iran, vase with double bowl reminding similar vessels from Shah Tepe and Crete, animal-headed handles simulating such features from Troy and Geoy Tepe, bowl on a broad hollow stem providing parallels at Tepe Hissar in eastern Iran, spindle-whorls or beads resembling those found from Troy and Anau etc. What do these western affinities indicate ?

Agrawal (1968 b, 261) on the basis of the above affinities and some other evidences equates the early Aryans with the Banasians who, as he thinks, borrowed the black-and-red ware from Lothal. The formulated equation appears to be quite suggestive. The black-and-red ware may perhaps be one of the plausible claimants in the run for being identified as a reminiscent of the early Aryans. But in that case, the early Aryans would be considered as almost contemporaneous with the Peripheral Harappans in the light of the available C^{14} evidence. Again, it would also indicate that the Aryans had roots in the pre-Harappa culture, at least in the region of Gujrat, if we subscribe to the opinion of Rao (AI, 18-19, 61) who thinks that the black-and-red ware was used by a local population even before the Harappans came to Gujrat. It would ultimately trap us in a most interesting hypothesis that the Aryans were indigenous, for no ceramic industry either identical to or resembling with the black-and-red ware has been brought to light so far beyond the frontiers of India except the Badarian or the black-topped ware in Egypt. These are some of the problems which have to be solved before we identify the Aryans with the Banasians.

The obtained C^{14} based upper limit for the Banas culture at Ahar raises a still more important question. What was the relationship between the Chalcolithic and the early Historic deposits at the site? To be more precise, the question arises whether the early Historic deposit was the continuation of the Chalcolithic one at Ahar. It was concluded by Sankalia (IAR 1961-62,50) that the occurrence of the Northern Black Polished ware, socketed arrow-heads of iron and a mixture of coarse red, slipped-red, plain black-and-red and black-painted red wares from the deposits of Phase IIA (early Historic) *interlocks* them with those of the preceding culture (Chalcolithic, Phase IC). Stratigraphically, Phase IC is succeeded by Phase IIA No gap between the two is reported. On the basis of the radiocarbon evidence the late level of Phase IC (Chalcolithic) has been dated to c. 1270 ± 110 B. C. or c. 1300 B. C. (TF.31). We have no C^{14} date for Phase IIA; however, on the ground of the occurrence of the N. B. P. ware it may be dated to c. 6th century B. C. at the maximum. We can not afford to go beyond it. Thus, we find a time-gap of at least seven hundred years between Phases IC and IIA, i.e. between the end of the Chalcolithic and the beginning of the early Historic, deposits at the site. In the light of the above evidence the proposed hypothesis of *interlocking* seems to be far from tenable.

It may further be pointed out that the hiatus between the Chalcolithic and the early Historic deposits is indicated not only at Ahar; a similar gap based on the evidence of radiocarbon dates is also hinted at Navdatoli (see *infra*). The above problem, thus, remains no more of a local character. In view of the importance of the problem, a fresh checking at the sites and closer investigations into the problem are highly needed.

MALWA CULTURE

We have only a few Malwa ware culture sites that provide radiocarbon dates. These are primarily Navdatoli and Eran, situated on the rivers Narbada and Betwa respectively. Geographically, their locations are significant as they represent roughly the two ends – the southern and the northern—of the present culture-complex. The implications of their C^{14} dates, particularly of the former, are still more significant, as they throw new light on some important problems of the Malwa culture. But unfortunately, most of the reported conclusions regarding the implications of C^{14} evidence have been derived either from the fragmentary data (Sankalia, 1958, XIII, IAR, 1958-59, 31, 1960, 1962, 88; Deo, 1965, 25) or from the available maximum spread (Agrawal, 1968 b, 120; Allchins, 1968, 186) without considering the question of the consistency of C^{14} dates with the corresponding stratigraphic sequence. An attempt has been made here to examine the full data so far available in the light of principles formulated earlier.

C^{14} DATES SCRUTINIZED

So far there are seventeen measurements for Navdatoli and Eran. The details of their examinations, and determinations of the respective time-brackets are discussed below.

Navdatoli [1] (Lat. 22° 11′ N., Long. 76° 36′ E.)

At Navdatoli the Chalcolithic deposits are designated as Period III (Sankalia, 1958, 20). From these deposits eight samples have been measured. These are—P-205, P-204, P-202 (Ralph, 1959, 45); P-476 (Stuckenrath, 1963, 82); TF. 59 (Kusumgar, 1963, 149); P-201, P-200 (Ralph, 1959, 45); and P-475 (Stuckenrath, 1963, 82). The first five are derived from layers 2 (Sub. Sq. M), 3 (Sub. Sq. G), 6 (Sub. Sq. A-18), 7 (Sub. Sq. A-17) and 9 (Sub. Sq. A-1)—all from trench I. The next two are from layers 8 (Sub. Sq. D) and 8 (Sub. Sq. W)—both from trench II. The layer of the last one is not mentioned; however, it is reported to be from the "near 'S' Section". The first five correspond respectively to the early level of Phase IV, the late level of Phase III, the late level of Phase II, the mid level of Phase II, and the late level of Phase I. The next two belong to the early level of Phase I, and the last one to the earliest floor of Phase I (Lal, 1963, 215-16). We have, thus, four dates for Phase I, two for Phase II, and one each for Phase III and Phase IV. The C^{14} dates read [2] 1[illegible]45 ± 130 B. C. for P-205, 1600 ± 130 B. C. for P-204, 1660 ± 130 B.C. for P-202, 2300 ± 70 B. C. for P-476, 1525 ± 110 B. C. for TF. 59, 1645 ± 130 B. C. for P-201, 1610 ± 130 B. C. for P-200, and 1610 ± 70 B. C. for P-475.

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[1] Besides Navdatoli and Eran, eighteen dates are also reported for Kayatha (Agrawal, 1969 a, 4-6; TIFR Date List, 1967a, July) of which twelve belong to the excavation conducted by Wakankar, and six to that of Sankalia. Of the former excavation four—TF. 396, TF. 397, TF. 402, and TF. 398—are for the Malwa horizon, but their results are completely inconsistent. The six dates—TF. 776, TF. 777, TF 778, TF. 779, TF. 780, and TF. 781—of the latter excavation are fairly consistent but their archaeological phases are not clearly indicated. Only a round term, 'Chalcolithic Period' has been mentioned. Hence, they are not incorporated in the present discussion.

[2] Measurements based on the half-life value of 5730 years are quoted from Agrawal, 1968 b, Table 3.

TABLE 14

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
P-205	Layer-2, Depth-?, Trench I, Sub. Sq. M.	Early level, Phase IV	1445±130
P-204	Layer-3, Depth-?, Trench I, Sub. Sq G	Late level, Phase III	1600±130
P-202	Layer-6, Depth-? Trench-I, Sub. Sq. A-18	Late level, Phase II	1660±130
P-476	Layer-7, Depth- 1.27 m., Trench-I, Sub. Sq. A-17	Mid level, Phase II	2300±70
TF. 59	Layer-9, Depth-2.75 m., Trench-I, Sub. Sq A-1	Late level, Phase I	1525±110
P-200	Layer-8, Depth-?, Trench-II, Sub. Sq.-W	Early level, Phase I	1610±130
P-475	Layer-?, Depth-2.03 m., Near 'S' Section	Earliest Floor Phase I	1610±70
P-201	Layer-8, Depth-?, Trench-II, Sub. Sq. D	Early level, Phase I	1645±130

A glance on the dates plotted in accordance with the stratigraphic sequence in Table 14 shows that all the dates, barring the three, i.e. P-204, P-202 and P-476, are fairly consistent. The above mentioned three dates are inconsistent not only in relation to the majority of consistent dates (P-205, TF. 59, P- 200, P-475 and P-201), but some of them are undependable due to other reasons also. The sample P-476 belonging to the mid level of Phase II reading 2300 ± 70 B C. is definitely too early for Phase II. Its extremely high date might be due to the post sample growth error, for the sample has been derived from a burnt wooden post. Again, the date for the late level of Phase III reading 1600 ± 130 B. C. (P-204) does not seem stratigraphically reasonable, if we compare it with the date of its immediately succeeding level, i.e. the early level of Phase IV reading 1445 ± 130 B. C. (P-205) which is consistent with a fairly large number of dates. The difference of the two (P-205 and P-204) reading 155 years is certainly too large for the two consecutive levels, i. e. the early level of Phase IV, and the late level of PhaseIII. In view of these factors the three dates – P-204, P-202 and P-476—seem to be invalid.

The remaining five dates (P-205, TF. 59, P-200, P-475 and P-201) are fairly consistent with the corresponding stratigraphic sequence. It is obvious, for these dates become growingly older as we move towards the stratigraphically earlier levels. On the basis of these dates a sufficiently dependable time-bracket may be determined for the site. The three dates (P-200, P-475 and P-201) of the early level of Phase I are almost of the same value. It is significant that the central measurements of the two of them, i.e. P-200 and P-475 are identical reading 1610 B. C. Keeping in view the remarkable identity in dates of the two separate samples from the same level (early level of Phase I) a date reading 1610 B. C. or c. 1600 B. C. can safely be assigned to the lower bracket at the site. For the upper bracket it may be noted that we have no dates for the uppermost level of Phase IV. However, we have one valid date (P-205) for its early level which reads 1445±13, B. C. On the basis of this date the uppermost level may tentatively be fixed around 1400 B. C. or a little later. Thus, the Chalcolithic deposits may be dated from c. 1600 to 1400 B. C. at the site with a span of rougly 200 years.

Eran (Lat. 24°5′ 16″ N., Long. 78°10′24″E)

The Chalcolithic deposits at Eran have been designated as Period I. We have nine dates for the various levels of these deposits. The dates are—P-525 (Stuckenrath, 1963, 82), TF. 327 (TIFR Date List, 1966 b, Aug.), P-526, P-527 (Stuckenrath, 1963, 82), TF. 329 (TIFR Date List, 1966 b, Aug , P-528 (Stuckenrath, 1963, 82), TF. 330 (TIFR Date List, 1966 a, May), TF. 331 (TIFR Date List, 1966 b, Aug.) and P-529 (Stuckenrath, 1963, 82). Their samples have been derived from layer 15 at a depth of 5.23 m., layer 17 at a depth of 6.8 m., layer 18 C at a depth of 6.01-6.27 m., layer 19 at a depth of 6.78—6.88 m., layer 19 at a depth of 7.5 m., layer 20 at a depth of 7.31-7.51 m., layer 20 at a depth of 7.65 m., layer 21 at a depth of 8.0 m., and layer 4 at a depth of 3.70-3.75 m. respectively. P-525 and P-529 belong to Trench Nos. 2C and Exten. B respectively, and the remaining seven samples to Trench No. 7. The samples P-525, P-526 and P-527 belong to the late level (Lal, 1963, 215), P-528 (Lal, 1963, 215), TF. 330 (TIFR Date List V, 1968 c, 133) to the mid level, and P-527 to the early level (Lal, 1963, 215). The levels of TF. 327, TF. 329 and TF. 331 are not reported. However, on the basis of their stratigraphic relations with those samples the levels of which are clearly mentioned, the samples TF. 327 and TF. 329 may be assigned in all probability to the late level, andTF. 331 to the mid level (?). The C^{14} dates* read 1340±70 B. C. for P-525, 1425±105 B. C. for TF. 327, 1280±70 B. C. for P-526, 640±60 B. C. for P-527, 1445±110 B. C. for TF. 329, 1015±65

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*Measurements based on the half-life value of 5730 years are quoted from Agrawal, 1968 b, Table 3.

B. C. for P-528, 1365 ± 100 B. C. for TF. 330, 1500 ± 95 B. C. for TF. 331, and 2035 ± 75 B. C. for P-529.

TABLE 15

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
P-525	ERN 2C, Layer-15, Depth-5.23 m.	Late level Period I	1340±70
TF. 327	ERN-7, VI-IX, Layer-17, Depth-6.8 m.	Late level,, Period I	1425±105
P-526	ERN-7 XIII-XVI, Layer- 18C, Depth 6.01-6.27 m.	Late level, Period I	1280±70
P-527	ERN-7, XIII-XIV, Layer-19, Depth 6.78-6.88 m,	Late level, Period I	640±60
TF. 329	ERN-7, VI‘-IX’ Layer-19, Depth 7.5 m.	Late level, Period I	1445±110
P-528	ERN-7, XVII-XIV, Layer-20, Depth-7.31-7.51 m.	Mid level, Period I	1015±65
TF. 330	ERN-7, IV‘-IX’, Layer-20, Depth-7.65 m.	Mid level, Period I	1365±100
TF. 331	ERN-7, ‘IV-IX, Layer-21, Depth 8.0 m.	Mid level (?), Period I	1500±95
P-529	Exten. B, Layer-4, Depth 3.70-3.75 m.	Early level, Period I	2035±75

The three dates, P-525, TF. 327 and TF 329, out of the five available for the late level, are obviously fully consistent as they become growingly older in relation to the corresponding stratigraphic sequence. The date (TF. 327, 1425 ± 105 B. C.) of the earlier layer 17 is older by 85 years than that of layer 15 (P-525, 1340 ± 70 B. C.) and again the date (TF. 329, 1445 ± 110 B. C.) of a still earlier layer, i.e. 19 increases by 25 years from that of layer 17. The remaining two dates, P-526 and P-527, for the late level are inconsistent not only with the other three consistent dates, mentioned above, but also among themselves. It is evident that the date (P-526 1280 ± 70 B. C.) for layer 1[illegible] C. is older than that of layer 19 (P 527, 640 ± 60) which is stratigraphically earlier than the former. These two dates are thus not dependable at all. On the basis of the available youngest valid date (P-525) reading 1340 ± 70 B. C., the upper limit of Period I at the site may be dated to c. 1400 B. C. within one standard deviation. Here it may be of interest to point out that the upper dates of the chalcolithic deposits at Eran and Navdatoli are the same.

Among the dates of the mid level, the two P-528 and TF. 330 are inconsistent as their values reading 1015 ± 65 B. C. and 1365 ± 100 B. C. respectively are younger than the three consistent dates of the late level. These two dates are unreliable also because their values do not correctly respond to the corresponding stratigraphy. Although both of them belong to the same layer (20), their readings substantially differ (compare P-528 with TF. 330). The remaining date (TF. 331, 1500 ± 95 B. C.) of the mid level (?) is however, fairly consistent with all the three valid dates of the late level.

For the early level we have only one date (P-529) which reads 2035 ± 75 B. C. So far as its consistency is concerned, it is surely consistent with the valid dates of the mid and the late levels, but in the light of other factors it is not a dependable one. In this connexion it may be pointed out that in view of this date the span of the early level would come to about 500 years, while the combined span of the mid and the late levels, based on valid dates, reads only about 100 years. Under the present circumstances, thus, the validity of P-529 becomes very doubtful. However, considering the span of the mid and the late levels, a date around 1600 B. C. may, on moderate estimate, be suggested for the early level at the site.

FINDINGS

Our findings throw some important light on some major problems of Navdatoli, the key site of the Malwa complex—the time-bracket and spread of the Chalcolithic deposit at the site, the relationship of the Chalcolithic (Period III) and the Early Historic (Period IV) Periods, and the alleged Western impact on the Malwa culture.

The Chalcolithic deposit at Navdatoli was originally dated to from c. 1000 to 500 B. C. with a span of 500 years on archaeological evidence (Sankalia, 1958, Xii). Later on, it was modified to c. 1200—700 B. C (Sankalia in IAR, 1957-58, 32); the span, however, remained the same. Subsequently, it was further modified to c. 2000—700 B. C. (Sankalia, 1962, 88). This time its span was stretched to 1300 years. But the radiocarbon evidence, as discussed above, places it from c. 1600 to 1400 B. C, providing a span only of 200 years. Thus in the light of C^{14} dates, the duration, as alloted to the four phases of Period III on the basis of archaeological evidence, needs a substantial modification.

Regarding the relationship of the Chalcolithic and the Early Historic deposits at the site, the learned excavator thinks that the Chalcolithic culture "does not seem to end abruptly, but it gradually disappears in the succeeding Early Historic Period with an overlap "(Sankalia, 1958, 21). And he confirms this theory by showing the occurrence of typical black-and-red ware with the evidence of inverted-firing in the deposits of the Chalcolithic Period, and its survival and predominance in the next period (Sankalia, 1958, 21). The archaeological evidence reveals that the painted black-and-red ware has concentration, whatsoever, only in Phase I of the Chalcolithic deposits (Period III). In Phase II it is quantitatively negligible. Again a few are mentioned from Phase IV. But from the Early Historic deposits (Period IV) not a single sherd of the 'painted' black-and-red is reported. The plain black-and-red ware, however, has been found from the deposits of Period IV, but it "has a semblance with—though the affinity to is not as yet clear—the more famous and better-made Megalithic Black-and-Red" (Sankalia, 1958, 134). It has perhaps no similarity either in shape or in type with that of the Chalcolithic levels. The latter is "thinner and smaller in size and shapes", when compared with the former (Sankalia, 1958,135). Among shapes, the former has only bowls or cups, while the latter has, besides bowls, dishes and basins also. The only common feature between the two lies in the so-called inverted firing' technique. But it may be pointed out that in recent years it has strongly been felt that the black-and-red ware is not exclusively the result of an 'inverted-firing'. In view of these, the evidence of an inverted-firing technique showing the main link between Period III and IV does not seem tenable No other clear evidence for the gradual disappearance of the Chalcolithic culture in the succeeding Early Historic Period is available. Under the present circumstances, it is not unlikely that the former had an abrupt end much before the people of the Early Historic Period inhabited the site.

The radiocarbon evidences also suggest the probability of a gap between Period III and IV. Period III on the basis of some valid C^{14} dates ends around

1400 B. C. We have no date for the early level of Period IV; however, on the ground of the occurrence of the N. B. P ware from the Early Historic Period, it may be dated to c. 500 or 600 B. C. at the maximum. In the light of above evidence we notice a considerable gap, roughly of 800 years, between the two. Here it may be of interest to point out that the archaeological evidences indicating the probability of *hiatus* between Period III and IV are also not absent at the site. In Trench III, the most important one at Navdatoli from the point of cultural sequence, the "layers 10 to 15 represent the debris of the Period III (Chalcolithic)......Layer 9 consists of small pellets of gravel and sand showing even-bedding. It also yielded a number of rolled potsherds. This feature was again noticed below the *pradaksinapatha* of the Stupa on Mound III" (Sankalia, 1958, 25). Here in Trench IV, a gravel layer (3) "consisting of evenly-bedded coarse sand and very small pebbles was found sealing the layers of Period III" (Sankalia, 1958, 27). On the basis of above evidences the excavator himself observes that "at the end of this period (Chalcolithic) there seems to have been a *great flood*" (Sankalia, 1958 25). He further observes that "shortly after this flood, habitation seems to have started again in this area" which is represented in Trench III by layers 3 to 8 belonging to the Early Historic phase. In view of above indications the gap seems to be almost certain. But the question still remains whether the duration of the gap was short, as the excavator thinks, or was long to the extent as partly hinted by the radiocarbon evidence.

Now about the problem of the West Asian influences on the Malwa culture. Sankalia (1958) initiating the problem mainly on the basis of some parallels among the finds of Navdatoli and some West Asian sites, such as Sialk, Hissar, Tepe Giyan etc, suggested the influence of the latter on the former. The hypothesis is quite interesting but has never been free from doubts. Rao (1962-63, 198) pointed out long ago that some of the ceramic forms of Navdatoli, supposed to have been of the Iranian origin, have already been found from earlier context in India itself. The bowl-on-stand of varying dimensions has been found at Harappa, Rupar and Lothal. Ahar IB has also yielded a bowl-on-stand analogous to the larger bowls and wine-cups of Navdatoli. In this connexion the stemmed bowl of Rangpur IIC and III evolved in stages has also been mentioned. At Harappa itself several bowls-on-stand were found. Similarly, "the spouted vessels need not have come from West Asia, as the Harappans already knew how to make spouts" (Rao, 1965, 171). Thapar (1965, 163) also observed that if certain pottery forms were introduced into India from Necropole B at Sialk and Tepe Giyan, why was not more useful trait of iron also adopted when it was associated in the assemblages represented in Necropole B and Tepe Giyan I. Misra (1965, 159) has attempted to defend it by the hypothesis of selective borrowing. In this connexion Thapar (1965, 172-73) has rightly pointed out that it would be difficult to explain if a utile metal like iron could be found unacceptable when pottery forms were freely borrowed. Gupta (1965, 170) has drawn our attention to the facts that "the channel spouted vases from Sialk have not only considerably longer channels but in addition have curved handles...if it was really a case of import or even influence or imitation, probably a highly utilitarian part like the handle would also had been kept or imitated as the case might be." Agrawal (1968 b, 101-105) discussing the problem in detail has convincingly refuted the alleged West Asian influence on the Malwa culture. Recently Dhavalikar (1970-71, 24) has raised the possibility of the derivation of the channel-spouted bowls from tho Southern Neolithic Culture. According to him "a careful study of the pottery from such sites as Brahmagiri, Tekkalakota, Piklihal, Sangankallu, T. Narsipur etc., shows that the channel-spout probably evolved from the lipped bowl through the short channel."

As regards the implication of C^{14} evidence on the problem of West Asian, more especially Iranian, influence to which we are mainly concerned, it may be noted that the C^{14} evidence has supported not only the doubts raised on the ground of archaeological evidence but has also presented a difficult barrier against the alleged speculation of the Iranian impact on the Malwa culture. Thapar (1965, 163) has pertinently hinted that on the basis of C^{14} determinations, Phases III and IV at Navdatoli which have yielded channel-spouted bowls matched with those from Necropole B at Sialk and Tepe Giyan I (both assignable to circa 1000-800 B. C.) cannot be dated later than 1200 B. C. According to our investigation of the full data of the C^{14} evidence, the Malwa culture ends around 1400 B. C. or a little later. The dating of Sialk B ranging from c. 1000 to 800 B. C. still occupies its original strength (Agrawal 1968 b, 105). Thus, a considerable gap, on point of time, lies between the end of Period III at Navdatoli and the beginning of Sialk B. As such, it is difficult to understand how the former could be a borrower. The Sialk B and other comparable levels offering close parallels, as said to have been, between Navdatoli and other Iranian sites may at the most lead us to only conclusion that it was the Iranian who borrowed, not the Navdatolian.

JORWE CULTURE

The Jorwe culture-complex named after the type-site Jorwe occupies a significant locale, both geographically and culturally. It mediates the two very important culture zones—the fertile Malwa plateau on the north representing 'the motherland of the Malwa culture", and the central Deccan on the south providing the earliest agricultural base in India. This part of plateau is mainly drained by Godavari and Krishna river system flowing eastward.

During the past decade a large number of sites yielding Jorwe ware assemblage have been excavated but, unfortunately, we have only three sites, Sonegaon, Nevasa and Chandoli which provide radio carbon dates. Besides, these dates have not been also properly applied to in assessing the chronology of the Jorwe culture. The assessment has been based either on the fragmentary data or on the maximum spread or on the position of cluster in general. Does this kind of generalisation adequately serve the purpose of absolute dating ? Of course it has its own limitations. Indeed, a minute and finer result is not possible where we have one or two dates for a site. But what inherent difficulties implicate in drawing the minute detail where sufficient consistent dates are available.

In the following pages an effort has been made to examine the complete C^{14} data so far reported and to assess the archaeological chronology in the light of valid dates.

C^{14} DATES SCRUTINIZED

Sonegaon (Lat. 18° 39′ N., Long 74° 5′ E.)

From Sonegaon the results of five samples TF. 379, TF. 380, TF. 382, TF. 384 and TF. 383 are available for the Jorwe culture deposits They are derived from layers 2b, 4, 5, 7, and corner of a baulk (layer not reported, Agrawal 1969 a, 4-6) respectively. All of them belong to one and the same trench MD. II. Their radiocarbon dates read 1290±95 B. C. for TF. 379, 1375±110 B. C. for TF. 380, 1340±100 B. C. for TF. 382, 1565±110 B. C. for TF. 384, and 1330±100 B. C. for TF. 383 (Agrawal, 1968 b, Table 3).

TABLE 16

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 379	Layer 2b, Depth 1.5 m., Trench MD. II	Jorwe Culture Deposit	1290±95
TF. 380	Layer 4, Depth 1.8 m., Trench MD. II	Jorwe Culture Deposit	1375±110
TF. 382	Layer 5, Depth 2.0 m., Trench MD. II	Jorwe Culture Deposit	1340±100
TF. 384	Layer 7, Depth 2.0 m., Trench MD. II	Jorwe Culture Deposit	1565±110
TF. 383	Corner of Baulk Layer ? Depth 4.3 m.,	Jorwe Culture Deposit	1330±100

A vertical comparison of these dates plotted in stratigraphic sequence (Table 16) reveals that except TF. 383 which comes from corner of a baulk, the remaining are fairly consistent. The date of layer 4 (TF. 380, 1375±110 B. C.) is older by 85 years than that of layer 2b (TF. 379, 1290±95 B. C.). Again, the dates of layers 5 (TF. 382, 1440 treated within one standard deviation) and 7 (TF. 384, 1565±110 B. C.) are older by 65 and 125 years than those of layers

4 (TF. 380) and 5 (TF. 382) respectively. None of them interrupts the order of consistency. The difference of each two consecutive dates is 'real' with 95% 'level of confidence. Since by adding two standard deviations on the younger and one on the older, the younger date still remains younger. This phenomenon has been noticed invariably in each set of two consecutive dates. It testifies thereby that these dates are consistent not only with the corresponding stratigraphic sequence but also 'real' to the maximum level of confidence.

As regards the determination of time-bracket we have no difficulty for the dates are fully consistent. The dates of layers 2b and 7 represent the available upper and lower time-bracket at the site which read 1290 ± 95 B. C. or c. 1300 B. C. and 1565 ± 110 B. C. or c. 1600 B. C. respectively.

Nevasa (Lat. 19° 31′ N., Long. 74° 54′ E.)

We have three dates from Nevasa—TF. 40 (Kusumgar, 1963, 150), P-184 and P-181 (Ralph, 1959, 45; Thapar, 1964-65, 155)—for its Chalcolithic deposits. Their samples have been derived from, layers 5, 10 and 11 respectively of the different trenches. But all of them belong to one and the same sub-phase, i. e. late phase of Period III (Thapar, 1964-65, 155). The radiocarbon dates read 1250 ± 110 B. C. for TF. 40, 670 ± 120 B. C. for P-184 and 1250 ± 125 B. C. for P-181.

TABLE 17

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 40	Layer 5, Depth 1.34 m., Trench No. 181	Late level: Period III	1250±110

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TABLE 17 (Contd.)

P-184	Floor SB Layer 10, Depth 6-70 m., MD. I, Trench F.	Late level, Period III	670±120
P-181	Layer 11, Depth 6.90 m., MD. I, Trench H	Late level, Period III	1250±125

Among these dates, P-184 may safely be omitted as it is inconsistent and also because there is a possibility of modern contamination according to the laboratory comments.

The remaining two dates TF. 40 and P-181 dated by two different laboratories, provide almost an identical result * (compare TF. 40 and P-181). They read around the middle of the 13th century B. C. and mark the available upper bracket, not the uppermost, of the present culture at the site. No date is available for the early level. Under present circumstances, it is not proper to extrapolate the lower bracket only on the basis of extension limit since this line of treatment has not been reliable.

Chandoli (Lat. 19° N., Long. 74° E.)

So far five dates TF. 42 (Kusumgar, 1963, 146-47), P-474, P-473 (Stuckenrath, 1963, 82), TF. 43 (Kusumgar, 1963, 146-47) and P-472 (Stuckenrath, 1963, 82) are available for this site. All of their samples have been derived from layer 2 of the different trenches and they belong to the early level of Period I. Their radiocarbon dates read 1170±120 B.C. for TF. 42, 1240±190 B. C. for P-474, 1330±70 B. C. for P-473, 1040±105 B. C. for TF. 43 and 1300±70 B. C. for P-472.

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*It may be recalled that the samples of these two dates TF. 40 and P-181 come from layers 5 and 11 respectively but they belong to different trenches. The position of the relationship of these layers is not clearly indicated. However, both the dates are said to have belonged to one and the same sub-phase, i.e. late phase. Inspite of that it may be noted that if these layers, stratigraphically, are not of equivalent status then the corresponding C^{14} dates should not be considered as dependable.

TABLE 18

Carbon-14 Dates and Corresponding Depth-sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 42	Layer 2, Depth .5 m., Trench-2	Early level, Period I	1170±120
P-474	Layer 2, Depth .76 m., Trench-9	Early level, Period I	1240±190
P-473	Layer 2, Depth .83 m., Trench-7	Early level, Period I	1330±70
TF. 43	Layer 2, Depth .86 m., Trench-7	Early level, Period I	1040±105
P-472	Layer 2, Depth .88 m., Trench-3	Early level, Period I	1300±70

These dates curiously enough provide a fairly consistent result borne out even by the depth-sequence, except TF. 43. The dates invariably increase while the depths go down. But it may be pointed out that they are, except TF. 43, of the same value within the 'counting error', which very well confirm their archaeological counterpart as they belong to one and the same layer. In this connexion it may be noted that the samples producing inconsistent and

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divergent readings (TF. 43 and TF. 42) were mixed with mud and soil. Their results might have been affected due to above factor. The mean of the remaining dates (P. 474, P. 473 and P. 472 which are of the same value reads 1310±47 B. C. or c 1300 B C It represents the lower time-bracket of this deposit at the site.

FINDINGS

The three dated sites clearly demonstrate that their time brackets are not uniform. At Sonegaon the lower-bracket reads around 1600 B. C while at Chandoli it does not go earlier than c 1300 B. C The upper-bracket at Sonegaon reads c. 1·00 B.C but at Nevasa it is roughly around 1200 B.C. What does this phenomenon indicate ? The available data are not sufficient of course for analysing the phenomenon, however, some guide line may be worked out by plotting the dates in the geographical order. It is interesting to observe that the dates gradually become younger on south-north axis. Sonegaon, the southernmost excavated and dated site, provides the oldest date (1565±110 B C or c. 1600 B.C). The dates become younger while we move towards north. At Chandoli it is c. 1300 B.C. and at Navdatoli,* further north, it reads around 1400 B. C. or a little older. It is, of course, slightly older than that of Chandoli but definitely much younger than that of Sonegaon. Do they show a movement from South to North ?

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*At Navdatoli the Jorwe ware occurs in Phase III. We have no dependable C^{14} date for this phase but the early level of Phase IV is dated to 1440±130 B. C. (P—205) by the valid C^{14} date. Considering the total time-span at the site for *Period* III which is hardly of 200 years, as discussed above, and the date available for the early level of Phase IV reading 1440 B. C., Phase III cannot be dated earlier than c-1400 B, C. or a little older.

Now let us examine what does the archaeological evidence speak about the chronology and movement? The archaeological chronology of the Jorwe culture mainly depends upon its stratigraphical relations with the Malwa ware for which three sets of data are available. The first set is represented at Sonegaon, Chandoli, etc, where the Jorwe ware appears together with the Malwa right from the beginning. The second set is represented at Navdatoli, Diamabad, etc., where the Jorwe is preceded by Malwa ware. And the third one is represented at Nevasa, Nasik, Jorwe, etc, where the Malwa ware is completely absent. On the basis of these broad data the following conclusions are generally drawn – that the Jorwe culture is younger than the Malwa since the latter precedes the former; that the sites yielding Jorwe ware in association with the Malwa right from the beginning are considered to be contemporaneous with that horizon of a site which produces both wares together with the Malwa ware preceding. Regarding the sites where Malwa ware is absent, no categorical discussion is available for the chronology. However, excavators are inclined to put them around the later phase of Navdatoli (Deo, 1965, 25; Sankalia, 1960, 68). The conclusions are quite logical and reasonable. But the radiocarbon evidences for the Malwa and Jorwe culture sites provide different suggestions. The available lower time-brackets of both the cultures, Malwa and Jorwe, coincide around c. 1600 B. C. It seems that both are contemporary. The C^{14} evidences further indicate that the sites yielding both the wares together are not always the late contemporary of Malwa culture. It is obvious from the facts that at Sonegaon, both the Malwa and Jorwe wares occur right from the very beginning, but, it dates around 1600 B. C. which is also a date for the Malwa culture at Navdatoli. Again, both the wares appear together at Chandoli but here its C^{14} date reads only c.1300 B. C. It appears from the aforesaid indications that where the

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Jorwe ware succeeds the Malwa, it is a case of late arrival rather than that of the late origin of the former. It may also be pointed out in this connexion that so far no date is available for the lower bracket of the pure Jorwe ware site. It is not unlikely that such site may prove to be older than that of even Sonegaon which has mixture of Malwa and Jorwe wares.

About the movement, we have nothing very substantial to show the Harappan or the late Harappan influence on the Jorwe culture, at least, to an extent on the basis of which any movement from the north or the north-west can be postulated. However, sometimes the influence in a most generalised form on the three fundamentals—copper, blades and painted red ware tradition - of the Chalcolithic culture of the northern Deccan is visualised. Certain common pottery types and the technique of crested guiding-ridge flaking are also considered as a link between the two. So far as copper is concerned it may be pointed out that the chemical, metallographic and typological data deny any link between the copper artifacts of Harappa and Malwa-Jorwe cultures (Agrawal, 1968 b, 217, 251, 261). The blade industry of the above two cultures also does not make any strong case for showing the Harappan influence. The typical Harappan ribbon-flake baldes are practically absent in the assemblages of Malwa and Jorwe cultures. Again, the blunted-backed blades invariably found in these cultures are not represented in the late Harappan and post-Harappan sites either in the Indus Basin or in Kathiawad. The suggested link by the common crested-ridge blades takes a new dimension in the light of the fact that they occur also in the Neolithic assemblages (Allchin, 1960, 97).

Under these circumstances are only a few pottery types common to both cultures sufficient to establish any substantial influence of the Harappa and later Harappa cultures on the northern Deccan chalcolithic ? The post-Harappan Chalcolithic cultures situated to the north of the Jorwe-complex region, and dated earlier than the Jorwe have also nothing conclusive to show a movement from the north. They also do not seem to have played any vital role either in the formation or in the development of the Jorwe culture. Now the question arises, what is its genesis ? Where to look for the origin and development of the Jorwe culture ?

In the assemblage of Jorwe culture we encounter at least some traits which seem to be the representatives of its adjacent Southern Neolithic Culture. The presence of these traits has long been recognised but the assessment of their potentiality and form is still due. One of the most characteristic lithic industries of the Neolithic culture, the polished stone tool, is now reported from all the important type-sites of Jorwe culture. Mention may be made of Sonegaon, Nevasa, Diamabad, Chandoli etc. Some of these sites for which detailed reports are available show that the polished stone tools are local products rather than import as they have been recovered in different stages of manufacturing (Deo, 1965, 26). Besides these typical neolithic polished tools, some other stone equipments such as quern, pounder, rubber, etc., are also reported.

Among other lithic industries it may be noted that microliths are also present in the assemblages of the Southern Neolithic sites, such as Brahmagiri (Wheeler, 1947—48, 250), Sanganakallu (Subbarao, 1948, 21, 23), Utnur (Allchin, 1961, 42), Piklihal (Allchin, 1960, 97), Tekkalakota (IAR 1963—64, 25) etc. A fluted core from T. Narsipur (IAR 1958-59, 33; 1964-65, 159 cyclostyled copy), and several guide-flakes from Piklihal (Allchin, 1960, 97) are also reported. It may specifically be pointed out that blades are represented in both the metal as well as the pre-metal phases (Utnur, Sanganakallu I and Piklihal I). Regarding blade industry, Sankalia observes that whether "it (blade industry) be regarded as a part of the same Neolithic complex or an impingement from the Northern Chalcolithic culture" (Sankalia, 1962 a 265). The latter part of his observation does not seem tenable especially in the light of radiocarbon evidence as the dates of Utnur (2300 ± 155 B. C., BM-54), T. Narsipur (1805 ± 110 B. C., TF. 412), and even of Tekkalakota (1780 ± 105 B. C, TF. 266) which represents the second phase of Neolithic culture of the south, are older than the dates of the Chalcolithic cultures of northern Deccan and central India (Sonegaon 1565 ± 110 B. C., TF. 384; Navdatoli 1610 ± 70 B. C., TF. 475).

Of the ceramic industry the grey and ochre-painted wares which invariably occur in the assemblage of Jorwe pottery deserve special significance. It may be pointed out that these are the characteristic wares of the Southern Neolithic Culture which appear right from the pre-metal phase. It is still more significant that over one and a half dozen types of the grey ware, both burnished and unburnished, of Piklihal (A1 & A2 wares—Types 2, 5, 8, 10, 12, 16, 17, 20, 24, 25, 27, 28. 29, 31, 34, 36, 37, 44) are comparable to those of Jorwe and Nasik (Allchin, 1960, 32-45).

The appearance of spouted vessels—both in grey and red wares, and also with and without painting in Jorwe ware assemblages is highly suggestive. In this connexion Sankalia observes that such type might have served as a proto-type, provided the neolithic every where in this area is earlier than the Pravara chalcolithic (Sankalia, 1960, 500). He further points that it "so far suggests a northern origin and diffusion into the south. But if a string of sites in the south yields such vessels from the neolithic levels, then the question will have to be reconsidered' (Sankalia, 1960, 500). In the light of recent researches the reconsideration of question seems to be a desideratum. Besides Brahmagiri where it was found in the lower stratum of sub-phase IB (Wheeler, 1947—48, p. 229, 231), two more neolithic sites in this area have witnessed the proto-type' of spouted vessel. These are Piklihal (Allchin, 1960, 28 also P. 32, Type 55 and Pl. 28, Type 44) and Tekkalakota (IAR 1963 - 64, 25; Nagaraja Reo, 1965, 37,42). Another specialised pottery type of Jorwe-Malwa complex, i. e. the channel-spouted* vessel is also represented at Brahmagiri (Wheeler, 1947—48,Fig 23, Types 77, 78), Piklihal (Allchin, 1960, Pl. 35, Type 51a, and T. Narsipur (IAR 1958—59, 33). At the last mentioned site the top of the spout is painted (IAR 1961—62, 35). Again, the perforated vessels represented at Diamabad, Chandoli, Nevasa and Sonegaon (Deo, 1965, 99) also occur in the assemblage of the Southern Neolthic (Subbarao, 1948, 18; Allchin, 1960, T .45 a-e and Pl. 29). It is significant that most of these sites yielding spouted, channel-spouted and perforated vessels are earlier than the Pravara Chalcolithic, and even the second phase of the Southern Neolithic has been dated ot c .c1800 B. C., the early phase represented at Utnur dates from c. 2300 to 2000 B. C. Apart from the plain pottery we find an encouraging background also for the painted pottery in the assemblages of the Southern Neolithic. Its all important sites such as Brahmagiri (Wheeler, 1947—48, fig. 18), Piklihal (Allchin, 1960, 47, 56), Utnur (Allchin, 1961, 25), Tekkalakota (IAR 1963-64, 25), Sanganakallu (Subbarao, 1948, 15; IAR 1964-65, I-55), T. Narsipur (IAR 1958—59, 33), etc., have the tradition of painting. It becomes still more significant in the light of the facts that some of their types and motifs also are comparable to those of Jorwe ware. Nearly half a dozen types of the ochre-painted grey ware of Piklihal (A2 painted ware—11 19, 28, 29, 44 and 50) have been compared with those of Jorwe—Nasik (Allchin, 1960, 48). It is interesting to observe that this ware perists throughout the period at the site and becomes more common in the upper Neolithic (Allchin, 1960, 25). Of the painting motifs the excavator of Piklihal suggests the nearest comparison with Jorwe (Allchin, 1960, 57). Besides the secular pots, we smell the affinity also in the non-secular pots. The burial-urns of Pravara Chalcolithic are invariably of grey ware. Does the specia preference to grey ware for urn reflect any emotional link with the grey ware people of south ?

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*Dhavalikar (1970—71, 24, 25) has also pointed out that "Channel—spouted bowls have been recovered from several neolithic sites in the southern Deccan and the available evidence shows that there is every possibility of their being copied by the Malwa culture folk. Moreover, this form of spout cannot be said to be a characteristic feature of the Malwa ware for the simple reason that it is absent at such Malwa culture sites as Kayatha, and even at Navda Toli it begins to occur in the third cultural phase of its occupation. The idea of a channel—spout thus appears at a later stage in the development of the Malwa culture.........a careful study of the pottery from such sites as Brahmagiri, Tekkalakota, Piklihal, Sangankallu, T. Narsipur, etc. shows that the channel-spout probably evolved from the lipped bowl through the short channel".

Now about the burial practice. There are broadly speaking two types of burials, pit and urn, in Jorwe culture. The special feature of the Jorwe burial practice lies in the disposal within a house complex. A similar practice is also found in the Neolithic culture. Both the types are represented at Brahmagiri (Wheeler, 1947—48, 202) and Tekkalakota (Nagraja Rao, 1965, 27 - 33). At Utnur (Allchin, 1961, 14) there is a reference to a child burial but not clearly mentioned whether it was of pit or urn type. However, the possibility of the latter may not be ruled out as "it contained several fragments of pottery" (Allchin, 1961, 15). Were these fragments part of the funerary furnishing or of urn itself is not known.

As regards the pit burial there is no controversy for it has been recognised at a number of sites, such as Brahmagiri (Wheeler, 1947-48, 202), Piklihal (Allchin, 1960, 22, 113), Tekkalakota (IAR 1963-64, 25), and T. Narsipur (IAR 1961-62, 35). Now the moot question remains, whether it was within the house complex or in a regular grave yard ? In this connexion the evidences of Brahmagiri (Wheeler, 1947-48, 203, 204), Piklihal (Allchin, 1960, 22, 133) and Tekkalakota (Nagaraja Rao, 1965, 27-33) showing the disposal within a house complex are highly suggestive. At Piklihal it was not found exactly within the house but not far from it (Allchin, 1960, 133). Of the other neolithic burials, details are not available.

Where all these facts lead to ? What type of form they suggest for the Jorwe culture ? Do they suggest the northern influence or they simply advocate the expansion with gradual transformation of the Neolithic culture of the southern Deccan ? Could it be a case of an accident only that, besides ground stone industry, nearly two dozen pottery types of Jorwe assemblage are comparable to those found in the both lower and upper neolithic phases which have been dated to c. 2300 and c. 1800 B.C. respectively ? Could it be again sheer chance that the tradition of painting having half a dozen types of Jorwe assemblage becomes more common in the upper neolithic ? Is it also a fact just of passing nature that the wheel-turned pots both painted and unpainted in Jorwe fashion occur in the late neolithic deposits (Allchin, 1960, 59) ? If these are not cases of sheer chance and accident, then would it be out of context to consider them as various stages of evolution of the Southern Neolithic Culture ?

EASTERN CHALCOLITHIC CULTURES

The recognition of the Chalcolithic cultures in Eastern India is a recent development. During the last decade the excavations at nearly half a dozen sites have brought to light the existence of Chalcolithic habitations in eastern Uttar Pradesh, Bihar and West Bengal. Besides, a fairly good number of sites, Chalcolithic in character, have also been located in different parts of this region. Prominent among the excavated and explored sites[1] are Pandu-Rajar-Dhibi, Mahisdal, Chirand, Sonpur, Kakoria, Rajghat[2], Nahusa Raja-Ka-Tila, Koldihwa[3] etc.

The cultural assemblages at the excavated sites are characterized mainly by a variety of pottery, lithic and bone tools, copper objects etc. The ceramic industry is represented by the black-and-red both plain and painted, the black-slipped, and the red wares. Among lithic tools mention may be made of microliths including the crested-ridge blades. Iron and bricks are absent.

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[1] Sometimes Prahladpur is found to have been included among the sites of Eastern Chalcolithic cultures, probably due to some contradictory statements in the report itself about the antiquity of iron at the site. The earliest occurrence of iron is reported on page 63 (Narain, 1968) in the late level of the Early phase designated as sub-period IA. But on page 9 of the same publication (Narain, 1968), plenty of iron slags are said to have recovered from 'Dump A' or the 'filling' deposited right on the natural soil which probably represents the earliest deposit at the site, as the remaining two layers, 5 and 6, of the sub-period IA have been interpreted by the excavator himself to have deposited against the 'filling' or 'Dump A.' By implication, thus, the antiquity of iron would go back to the lower level of the Early phase at the site.

[2] The C^{14} date for the black-slipped ware deposit at the site has been discussed in Chapter VII (*infra*).

[3] The excavation at Koldihwa, situated on the river Belan (District, Allahabad, Uttar Pradesh), being conducted by the University of Allahabad is in progress. Among the finds collected from the surface mention may be made of the black-and-red ware, the black-slipped ware, the red ware, microliths, a few specimen of stone celts, and a large number of bone implements comparable to those of Chirand.

With a view to understand the nature of cultural contents represented at various sites, a brief survey of the assemblages is being given. At *Pandu-Rajar-Dhibi* (Dasgupta, 1964), District Burdwan, West Bengal, the Chalcolithic deposits are marked by hand-made greyish or pale red pottery, the black-and-red ware both plain and painted, the painted red and the lustrous red ware. The paintings are in black and white pigment. The shapes, taking all the wares in consideration, comprise bowls, basins, channel--spouted bowls, dish--on-stand, bowls-on-stand, lids, dishes, vessels with perforation at the bottom, high-necked jars etc. Among copper objects, important are beads, bangles, nail-parer, antimony rods etc. Silk and cotton textiles are also said to have been used. The other finds include short lithic blades including the crested ridge, bone tools and weapons, rice etc. The evidence of animal diet which included the meat of nilgai, deer, pig and fish is also reported. At *Mahisdal* (IAR, 1963-64, 59, 60), District Birbhum, West Bengal, the Chalcolithic deposits are designated as Period I. The ceramic industry consists of the black--and--red ware both plain and painted in white as well as in black, the black-painted red ware, the red ware both plain and incised, the black ware, plain, incised and also with pin-hole designs. The prominent types in all the wares are lipped or channel-spouted bowl, carinated with flaring rim and convex-sided bowl. The other associated finds comprise microliths (small in quantity), copper-celt with convex cutting edge, terracottas, bone objects such as pin, comb and bangle, beads of steatite and semi-precious stone, and large quantity of charred rice. At *Chirand* (IAR, 1963-64, 6-8; 1964-65, I-12, I-13)*, District Saran, Bihar, in the Chalcolithic deposits, the ceramic industry is

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*Page number preceded by the sign 'I' refers to the cyclostyled copy of *Indian Archaeology—A Review.*

represented by the black-and-red ware both plain and white or cream-painted, the black-slipped mostly plain and occasionally painted, red ware both plain and painted, the cream-slipped ware etc. Noteworthy types among all the wares are high-necked jar, vase, bowl, basin, dish, dish-on-stand, spout, footed bowl, perforated pot etc. The use of microliths and copper is very restricted. Among other finds a variety of bone objects, terracotta, and beads of semi-precious stone may be mentioned. At *Sonpur* (IAR, 1956-57, 19; 1959-60, 14; 1960-61, 4, 5; 1961-62, 4, 5), District Gaya, South Bihar, the Chalcolithic levels are characterized by the black-and-red ware, the black ware and the red ware. The tradition of painting is not represented here. The other finds include microliths, bone object, sling balls etc. *Kakoria* (IAR, 1962-63, 39-41; 1963-64, 57-58), District Varanasi, Uttar Pradesh, situated on the foot hills of the Vindhyas has brought to light a significant Chalcolithic-Megalithic complex. The occupational deposits at the habitation area are characterized by microliths, ill-fired red ware, the black-and-red ware, the black-slipped, and copper. The tradition of painting is not represented here. Among the noteworthy shapes, in all the wares, mention may be made of shallow dish, trough, funnel-shaped lid with cylindrical body, pedestalled bowl, legged and perforated bowl, jar with everted rim etc. So far as the lithic industry is concerned, Kakoria is the most significant among all the excavated sites of the Eastern Chalcolithic complex. Here, microliths occur in abundance. It may be noted that at other sites such as Sonpur, Chirand, Mahisdal and Pandu-Rajar-Dhibi, all situated to the east of Kakoria, microliths do not seem to be a prolific industry. Misra (1970b, 251) has pertinently observed that the lithic industry at the above mentioned sites, excepting Kakoria, was probably a dying force.

From the aforementioned brief survey it appears that despite local variations in certain individual traits, the Eastern Chalcolithic cultures are broadly homogenous in their cultural contents. Misra (1970 b, 244) has pointed out that the use of black-and red ware, microliths with crested-ridge blades, and familiarity with potters wheel can be considered as some of the unifying factors. The pattern of settlement is also more or less similar in these cultures. Sankalia (1970, 9) has also observed a general cultural unity or affinity. The reverine character of the settlement is also very significant. Among the variations the most striking one is the painted pottery which does not occur in all the sites. We do not have the tradition of painting at sites such as Kakoria and Sonpur, whereas the sites like Chirand, Mahisdal and Pandu-Rajar-Dhibi have the paintings.

The above survey also brings into focus some of the finds which may have wider implications. In this connexion the following points may be noted. First, that there are certain pottery types at various sites of the Eastern Chalcolithic cultures which seem to be similar in basic conception to those found at the sites of the central, the northern Deccan, and also at the Southern Indian Neolithic cultures. Secondly, that the lithic tools in the Eastern Chalcolithic cultures tend to become almost out of use at the sites situated to the east of Kakoria. Thirdly, the geographical situation of Kakoria may specifically be noted as it is situated at the cross-road connecting the central and the southern India, on the one hand, and the eastern India, on the other. Lastly, that at Chirand the Chalcolithic occupation rests on the sub-stratum of Neolithic* deposits without showing any cultural break between the two.

The archaeological chronology of the Eastern Chalcolithic cultures is still in a formative stage.

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*Sankalia (1970, 7, 8) considers Chirand as early copper-smelting site. He does not agree with the Neolithic labelling.

The extremely limited archaeological data at our disposal are not sufficient enough to formulate any meaningful chronology. However, some radiocarbon dates are available for some of the excavated sites which we will examine in the subsequent section.

C^{14} DATES SCRUTINIZED

We have three sites, Mahisdal, Chirand and Kakoria which provide radiocarbon dates for the Eastern Chalcolithic cultures.

The dates of Kakoria have been discussed in the context of Megalithic culture. However, it may be noted here that all the dates of Kakoria suffer from modern contamination. The details of the examination of dates for other sites are as below. We begin from the easternmost site.

Mahisdal (Lat. 23° 42′ 45″ N., Long. 87° 41′ 33″ E).

There are three dates, TF. 390, TF. 392, and TF. 391 (Agrawal, 1969 a, 4-6), for the Chalcolithic deposits at the site. Their samples belong to Trench MDL-1 and are derived from layers, 4, 5, and Pit 3 SB layer 5. TF. 390 is reported to have belonged to the late phase, but, for the remaining dates the subphases are not available, only a round term 'Chalcolithic Period' is mentioned. The C^{14} dates read 855±100 B. C. for TF. 390, 1085±110 B. C. for TF.392, and 1380±105 B. C. for TF. 391.

TABLE 19

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 390	Layer 4, Depth 1.45 m., Trench MDL-1	Chalcolithic (Late Phase)	855±100

Table 19 (Contd.)

TF. 392	Layer **5**, Depth 1.30 m., Trench MDL-I	Chalcolithic	1085±110
TF. 391	Pit 3 SB Layer 5, Depth 1.61 m., Trench MDL-I	Chalcolithic	1380±105

All the three dates are consistent with the corresponding stratigraphic sequence, as the dates for the lower strata are invariably older than the upper one. For instance, the date for layer 5 (TF. 392) reading 1085±110 B.C. increases by 230 years from that of layer 4 (TF 390) which reads 855±100 B.C. Again, the date for Pit 3 SB layer 5 (TF. 391) reading 1380±105 B.C. rises by . 95 years from that of layer 5 (TF. 392). The above facts no doubt show that the dates are consistent with the corresponding stratigraphic sequence but all of them suffer from some serious lacunae which need special attention.

As computed above the difference in the first two dates for the two consecutive layers, 4 and 5, comes to 230 years, and of the last two dates belonging to layer 5 and the pit sealed by the same layer reads about 300 years. Now the question arises whether the above differences reasonably explain the span of the consecutive layers. Does the difference in dates of about 300 years for a pit and its sealing layer satisfactorily explain the relationship of the two? In view of these factors, none of the three dates seems to be ideally qualified to date the site, the date for the pit at least should not be taken as dependable. However, the remaining two dates may tentatively be considered for determining the date-bracket of the deposits at the site.

In connexion with the date-bracket it may be noted that no clear information is available regarding the position which the layers 5 and 4 occupies in the entire Chacolithic deposits at the site. Under the circumstances, it is not proper to fix either the initial or the terminal limits. TF. 390 is said to have belonged to the late phase but here also it is not clear if it represents the uppermost layer of the same phase. Thus, on the basis of these two semi-valid dates one can at the most conclude that the Chalcolithic deposits were probably in existence from 1085 ± 110 B. C. or c. 1100 B. C. to 855 ± 100 B. C. or c. 800 B. C. at the site.

Chirand (Lat. 25° 45′ N., Long. 84° 45′ E.)

From Chirand we have five dates for the Chalcolithic deposits. These are TF. 444 (Agrawal, 1969a, 4-6), T.F. 334 (Agrawal, 1966a, 4-5), TF. 445 Agrawal, 1969a, 4-6), TF. 1029 (TIFR Date List, 1971a, March), and TF. 1028 (TIFR Date List, 1971b, Aug.). The samples TF. 444, TF. 334 and TF. 445 are derived from layers 16 (Trench VII) 18 (Trench VIIB), Pit in natural soil sealed by layer 11 (Trench CRD X) respectively, and belong to different trenches. Samples TF. 1029 and TF. 1028 come from layer 10 at the depths of 6.5 m. and 6.50 m. respectively, and both of them belong to trench CRD-XI. The correlations of the layers which belong to different trenches are not reported. Under the circumstances, it is difficult to form any definite idea about the stratigraphic sequence of these dates. However, TF. 445* seems to be a date for the earliest level as it belongs to a Pit in *natural soil*. TF. 1028 which belongs to layer 10 (Trench CRD-XI) is said to have been for the transitional level between the black-and-red ware and Neolithic deposits. TF. 1029 may also be assigned to the same level as it also comes from the same layer and the same trench, the depth of course differs. Stratigraphically, these three may roughly be considered as contemporaneous. Of the remaining two, TF. 444 and TF. 334, we cannot say anything about their stratigraphic sequence even to the extent as in the case of the earlier three. It becomes still more difficult also because their sub-phases have not been furnished, only the periods have been reported. The C^{14} dates read 715±105 B. C. for TF. 444, 845 ±125 B. C. for TF. 334, 1050±90 B. C. for TF. 1029, 1540±90 B. C. for TF. 1028, and 1650±100 B. C. for TF. 445.

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*Sample TF. 445 is reported to have been derived from a pit from which a large number of microliths, unassociated with any ware, were collected. It has been cautioned that this date should not be used to date the 'Black & Red Ware' levels of Chirand (Agrawal, 1969 a, 4-6).

TABLE 10 A

Carbon-14 Dates and Corresponding Stratigraphic Sequence (*Approximate*)

Index	Locus	Arch. Date	C^{14} Date
TF. 444	Layer 16, Depth 10.5 m., Trench CRD-VII	Chalcolithic	715±105
TF. 334	Layer 18, Depth 12.5 m., Trench CRD-VIIB	Period IA	845±125
TF. 1029	Layer 10, Depth 6.5 m., Trench CRD-XI	Chalcolithic	1050±90
TF. 1028	Layer 10, Depth 6.50 m., Trench CRD-XI	Chalcolithic	1540±90
TF. 445	Pit in Natural Soil SB. layer 11, Depth 8.2 m., Trench CRD-X	Period I A	1650±100

Dates plotted in Table 20A seem to be fairly consistent but in view of the lacunae pertaining to the furnishing of some necessary data, as mentioned above, it is not proper to draw any decisive conclusion from the dates of the Chalcolithic deposits alone. We, therefore, propose to evaluate them in the light of those available for the Neolithic* deposits at the site which belong to the layers of a single trench, providing thus a coherent stratigraphic profile to the corresponding dates. There are nine dates for the Neolithic deposits TF. 1030, TF. 1031, TF. 1032, TF. 1125 TF. 1033, TF. 1126, TF. 1034, TF. 1036, and TF. 1127 (TIFR Date List, 1971a, March). Their samples have been derived from layer 11 at a depth of 6.9 m., layer 12 at a depth of 7.2 m., layer 13 at a depth of 7.5m., layer 14 at a depth of 7.5 m., layer 14 at adepth of 8.5 m., layer 15 at a depth of 8.1m., layer 15 at a depth of 9 m., layer 17 at a depth of 10.1 m., and layer 17 at a depth of 10.3 m. respectively. All of them belong to Trench CRD-XI. Luckily, two samples of the Chalcolithic deposits, i.e. TF. 1029 and TF. 1028, reported above, both derived from layer 10 at the depths of 6.5 m. and 6. 50 m. respectively, also belong to the same Trench CRD-XI. These two dates are significant also because the layer, i.e. 10, from which their samples have been collected, represents the transitional level between black-and-red ware and Neolithic deposits. In case they are found consistent with the other dates, then it would be of great help to us in determining the initial date for the Chalcolithic as well as the terminal one for the Neolithic deposits at the site. The C^{14} dates of the Neolithic levels read 1580±100 B. C. for TF. 1030, 1675±140 B. C. for TF. 1031, 1755±155 B. C. for TF. 1032, 1515±155

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*By the time the present part of our manuscript was being sent for printing, a fairly large number of C^{14} dates for the Neolithic deposits became available. The earlier statement regarding the number of dates available for the Neolithic Chirand (*supra*, p. 61) may be rectified.

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B. C. for TF. 1125, 1540 ± 110 B. C. for TF. 1033, 405 ± 125 B. C. for TF. 1126, 1570 ± 115 B. C. for TF. 1034, 605 ± 125 B C. for TF. 1036, and 1375 ± 100 B. C. for TF. 1127.

TABLE 20 B

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 1029	Layer 10, Depth 6.5 m., Trench CRD-XI	Chalcolithic	1050±90
TF. 1028	Layer 10, Depth 6.50 m., Trench CRD-XI	Chalcolithic	1540±90
TF. 1030	Layer 11, Depth 6.9 m. Trench CRD-XI	Neolithic Culture	1580±100
TF. 1031	Layer 12, Depth 7.2 m., Trench CRD-XI	Neolithic Culture	1675±140
TF. 1032	Layer 13, Depth 7.5 m, Trench CRD-XI	Neolithic Culture	1755±155
TF- 1125	Layer 14, Depth 7.5 m., Trench CRD XI	Neolithic Culture	1515±155
TF. 1033	Layer 14, Depth 8.5 m., Trench CRD-XI	Neolithic Culture	1540±110
TF. 1126	Layer 15, Depth 8.1 m., Trench CRD-XI	Neolithic Culture	405±125
TF. 1034	Layer 15, Depth 9 m, Trench CRD-XI	Neolithic Culture	1570±115
TF. 1036	Layer 17, Depth 10.1 m., Trench CRD-XI	Neolithic Culture	605±125
TF. 1127	Layer 17, Depth 10.3 m., Trench CRD-XI	Neolithic Culture	1375±100

Dates incorporated in Table 20 B includes only those which belong to the same trench CRD-XI. Among these, the two are for the Chalcolithic and the nine for the Neolithic deposits. It is perhaps the only, among all the dated sites so far in India, which provides such a large number of dates in vertical profile from a single trench. It is significant that their samples, without exception, have been derived from regular layers, none of them is from pit. So the chances of contamination at the field are very less. Besides, these dates are also important because they furnish ample scope for the checking of their validity in the context of stratification. We have as many as four such layers which have two dates for each. They are layers 10, 14, 15, and 17. TF. 1029 and TF. 1028 belong to layer 10, TF. 1125 and TF. 1033 to layer 14, TF. 1126 and TF. 1034 to layer 15, and TF. 1036 and TF. 1127 to layer 17. These data are important as they would be of great use for assessing the behaviour of C^{14} dates.

We take up the above data first. Dates of layer 10, TF. 1029 and TF. 1028 reading 1050±90 B.C. and 1540±90 B. C., are consistent with the corresponding depths as the latter belongs to a slightly greater depth, but their date-difference which comes to about 500 years is more than alarming. The dates for layer 14, TF. 1125 and TF. 1033 reading 1515±155 B. C. and 1540±110 B. C. respectively, are almost the same. But again the dates for layer 15, TF. 1126 and TF. 1034 measuring 405±125 B. C. and 1570±115 B. C. respectively, though consistent with the depth-sequence, are highly undependable as their difference is more than of 1100 years, despite the fact they belong to the same layer. The dates of layer 17, TF. 1036 and TF. 1127 reading 605±125 B. C. and 1375±100 B. C. respectively, also repeat the same story. They are consistent with the depth-sequence but their difference is also more than of 700 years. Among the four pairs of dates, each belonging to the same

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layer, only the one, i.e. of layer 14, has correctly responded; the remaining three comprising six dates have been found unreliable.

While examining the behaviour of all the dates in relation to the corresponding stratigraphy, we find that the majority of them is either inconsistent or questionable due to some other reasons. We begin from the date of upper layer. As we discussed earlier the two dates for layer 10, TF. 1029 and TF. 1028, are heterogenous. The difference between the two is so large that they are not of the same value even within five standard deviations Among these, which one should be considered valid is difficult to determine; however, TF. 1028 the older one reading 1540±90 B. C may tentatively be preferred since its relation with the date (TF. 1030, 1580±100 B. C.) for the immediately preceding layer (11) is reasonable. They are consistent and their difference reading 40 years is also satisfactory. Dates for layers 12 and 13 measuring 1675±140 B. C (TF. 1031) and 1755±155 B. C (TF. 1032) respectively are also consistent. But it may be noted that we have single date for each of them*, i.e. layers 11, 12, and 13. Dates for layers 14, 15, and 17 comprising six measurements, i.e. TF 1125, TF. 1033, TF. 1126 TF. 1034, TF. 1036, and TF. 1127 are completely inconsistent as all of them are younger than that TF. 1032 belonging to layer 13. It may be recalled that the date of layer 13 is consistent with those for layers 10, 11 and 12.

Among the consistent dates TF. 1028, layer 10, reading 1540±90 B. C. belongs to the transitional level of the black-and-red ware and Neolithic deposits. On this basis the initial date for the Chalcolithic as well as the terminal one for the Neolithic[1] deposits may tentatively be dated to c. 1550 B. C. or c. 1600 B. C. at the maximum. The conclusion remains tentative mainly because a separate date (TF 1029) for the same layer 10 does not corroborate the measurement of TF. 1028. For the determination of the terminal date of the Chalcolithic deposits at the site, the available data are not adequate. We have already discussed earlier that most of the dates for the deposits in question are of an isolated nature as their stratigraphic correlations are not reported.[2]

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*The need for the checking of their reliability by more dates from the same layers becomes indispensible in the light of the facts that the measurements of all the layers, except 14., which have at least two dates for the same layer have been found completely unreliable (cf. TF. 1029 and 1028, layer 10; TF. 1126 and TF. 1034, layer 15; TF. 1036 and TF. 1127, layer 17)

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[1] For the determination of the initial date of the Neolithic deposits at the site, the available data are not dependable as all the six dates for the lower levels are inconsistent. However, some idea may be formed by calculating the probable span of the layers lying below the validly dated level, but the estimate so derived would always remain subject to modification. We have here at least four layers, below the layer 13 which is dated and may be considered dependable also. The span of the upper four consecutive layers, 10 to 13, comes to about 200 years. Considering the above scale, if we estimate even 150 years for the four lower layers (14 to 17), the lower bracket (?) may provisionally be fixed around 1900 B. C. (TF. 1032, 1755+150=1905). In the light of this provisional date the spread of the Neolithic deposits at the site would read about 350 years.

[2] In case the layers from which the samples TF. 444 and TF. 334 have been derived are correlated, the upper limit, not the uppermost, may tentatively be dated to c. 800 B. C., within one standard deviation, on the basis of the available youngest consistent date represented by TF. 444 reading 715±105 B. C. But this date is also required to be verified by more dates from the same layer. The Chalcolithic deposits at the site can be placed from c. 1600 to 800 B. C. with a span of about 800 years, provided the upper date-limit, as indicated above, is corroborated by some more dependable dates. At present it is extremely provisional for the reasons discussed above.

FINDINGS

For the Eastern Chalcolithic cultures there are practically only two dated sites ,Mahisdal in West Bengal and Chirand in north Bihar. The dates, neither of them, are ideally qualified for dating either the initial or the terminal limits at the respective sites. Sometimes the merit of dates as such is questionable in the light of corresponding stratigraphy. In the case of the former site the dates although consistent with the corresponding stratigraphic sequence, the differences, between layers 4 and 5, on the one hand, and 5 and the pit sealed by layer5, on the other, measuring 30 and 295 years respectively, do not reasonably explain the span of the consecutive deposits. Besides, in the absence of the information about the position of the dated layers which they occupy in the complete stratigraphic profile of the Chalcolithic deposits at the site, it is difficult to fix either the initial or the terminal limits. However, on the basis of the semi-valid dates, TF. 392 and TF. 390, one can at the most say that the Chalcolithic occupation was, probably, in existence from c. 1100 to 800 B. C. at the site.

The dates for Chirand are also not on firm footing. All the dates for its Chalcolithic deposits are of an isolated nature as the correlation of their respective layers which belong to different trenches is not available. It, thus, precludes us from forming any definite idea about the coherent stratigraphic sequence of all the dates. It is, therefore, just not possible to check the position of their consistency in relation to stratigraphy However, on the basis of TF. 1028 belonging to the transitional level, the initial date for the Chalcolithic *vis a vis* the terminal one for the Neolithic deposits* can tentatively be

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*For the initial date of the Neolithic deposits at Chirand, we do not have any dependable date. However, as discussed

(Contd.)

assigned to c. 1600 B. C., as it is fairly consistent with at least three dates of the Neolithic occupation. The terminal date for the Chalcolithic one is still more uncertain. It may, however, provisionally be placed around 800 B. C. within the provisos discussed earlier.

The dates of Chirand particularly those that belong to a single trench 'CRD—XI' comprising eleven determinations, the nine for the Neolithic and the two for the Chalcolithic deposits, are significant in many ways. As mentioned earlier, it is the only Indian site that provides such a large number of C^{14} dates from a single trench, furnishing thus a coherent stratigraphic profile to the available dates. It is also noteworthy that all the samples of these dates belong to the regular layers, none of them is from pit. Hence, here the chances of contamination at the field are very less. Besides, there are as many as four layers which have two dates for the each. All these factors, thus, make a good model for offering some important observations pertaining to the determinations of archaeological events in the light of C^{14} evidence. It is clear from the behaviour of C^{14} dates of Chirand, as discussed earlier, that it is always risky to postulate any conclusive thesis regarding chronology just on a few dates; and it is rather dangerous to depend upon a single date. In this connexion the following readings may be observed: that the two dates for the same layer are rarely of the same value (see Table 20 B); that the dates are seldom found to be consistent where there is an opportunity to check them by more dates of the same layer; that the seven dates out of the eleven are alarmingly inconsistent. It is needless, thus, to emphasize as to what a tremendous precaution is

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earlier, it may roughly be placed around c. 1900 B. C. While comparing its lower limit with that of the Southern Neolithic Culture, it appears to be an early contemporary of the "C^{14} based Phase IA" (*supra*, p. 46) required to frame any conclusive chronology even where sufficient dates are available, the reliability of a single or a few dates is in no way better than simple guess.

In the light of extremely provisional date-bracket, as hinted earlier, the Chalcolithic culture of Bihar (c. 1600 - 800 B. C) seems to be older than that of Bengal c. 1100—800 B. C.). While comparing the former with the other Indian Chalcolithic cultures, it appears to be an early contemporary of the Malwa (c. 1600 – 1400 B. C.) and the Jorwe c. 1600 -- 1200 B. C.), and the mid contemporary of the Banas c. 2100-1300 B. C.). So far as the span is concerned the Chalcolithic Chirand matches only with the Banas* as both have spread of about 800 years. It is interesting to point out that among the dates of the other Chalcolithic cultures, the date c 1600 B. C is quite striking one as it is common to at least three principal cultures of In dia—Jorwe, Malwa and Chirand-- distributed in widely separate pockets. It was during 16th century B. C. that the Jorwe culture in the northern Deccan witnessed some important development over the Neolithic way of life to which it was, probably, genetically related; the Malwa culture in the central India also appeared on the scene at the same time-plane; again, the Chirand in north Bihar also seems to have evolved from the Neolithic root around 1600 B. C. But what do all these hint at ? Whatever may be the facts, it is at least certain that the Neolithic people of the relevant regions must not have thought to change themselves into Chalcolithic way of life at one time-plane. We will have to ex-

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*TF. 1028 on which the early dating of the Chalcolithic Chirand is based became available after the portion dealing with the Banas culture in the present work was printed. The relevant statement regarding the comparison of Banas with the other Chalcolithic cultures on page 84 *supra*, may be recified plore some other possibilities to explain the temporal coincidence. For the qualitative change, from the Neolithic to the Chalcolithic, the inner contradictions must have played a vital role but the change occurring in widely apart regions at one time-plane simply could not have been possible without the impact of some common external force or forces. The question now arises whether there was any such force or forces working within the limits of Indian boundry itself in or about the 16th century B. C. We notice the onset of aridity in the part of north-west India around 1800 B. C (Singh, 1971, 188) resulting in the weakening of the Central Harappa Culture. Its final disintegration on the basis of radiocarbon evidence, probably, occurring in about 1700 B. C. was a powerful event in Indian sub-continent which must have had far reaching consequences on the contemporary Indian life. The event may be hinted, especially in the light of the closeness in dates, as one of the external forces which might have caused to the temporal coincidence of the Chalcolithic Jorwe, Malwa and Chirand.

CHAPTER V

MEGALITHIC CULTURE

Much work has been done on the problem pertaining to the lacunae in the dating of Megalithic culture during the post 'Wheeler Era' of Indian archaeology but due to the dissipated nature of enquiries the problem still remains in the melting pot. The problem, infact, needs multidisciplinary study of the cultural contents, especially the iron implements, of the megalithic people as it may offer some important clue to the problem of relative dating of the culture in question. It also requires a co-ordinated investigation in the typological chronology of the megalithic burials and their relationship with those of the preceding Chalcolithic cultures. In the recent years, however, some momentum has been geared in this direction, possibly, because of the growing realisation in the academic world of the intimate relationship between the question of the onset of the Iron Age in India and the dating of the Indian Megalithic culture. The bringing out some more evidences interlocking the Iron Age Megalithic occupations with the Chalcolithic deposits, and the early dating of the latter corroborated by the radiocarbon determinations have engineered a new enthusiasm to the field workers to make deeper enquiry about the relationship of the two. Further, the researches confirming the existence of the Iron Age megaliths of some earlier date in the northern India, and the discovery of a group of pre Iron Age megaliths in the districts of Uttar Pradesh have given a new dimension to the problem of the chronology of the Indian Megalithic Culture.

A brief survey of the archaeological evidence on which the chronology of the Megalithic culture, primarily, depends is presented below. We proceed from the Iron Age megaliths of south.

Wheeler's 1947—48) digging at Brahmagiri offered a firm stratigraphic sequence to *a particular group* of Indian megaliths but it was unfortunate that the time-bracket suggested by him strictly to the Brahmagiri group was used for a long time as a datum-bracket for the entire megaliths. He had provisionally framed a bracket from c. 200 B. C.* (or a little later) to A. D. 50 with positive statement that the "dating applies *only to the Brahmagiri*, and involves the implication that else where, presumably further south or west, are other port-holed cists of earlier date" (Wheeler, 1947—48, 202). The upper date limit, i.e. A. D. 50 is mainly based on the initial dating of the Andhra Culture that succeeds the Megalithic occupation interlocking each other by cultural overlap. The beginning of the Andhra Culture at the site has been dated by the following two main pieces of evidence :—

"(i) At Chandravalli (Chitaldrug), with many Satavahana coins five Roman denarii minted in the first half of the first century A. D. have been found on a town-site of which the major occupation represents the distinctive features here labelled the 'Andhra Culture'. One of the coins, a denarius of Tiberius (minted c. A. D. 26—37), was found in 1947 under closely observed conditions in a layer pertaining to this culture. Another, a coin of Augustus (minted c. 2 B. C.—A. D. 11), was found......with yellow-painted pottery at a low, but not the lowest, level of this culture. Whatever the precise chronological value of these Roman coins, they at least show that the Andhra material with which they are associated cannot be earlier than the first half of the first century A. D. It may be later. (ii) Dishes of an individual type bearing concentric rings of rouletted pattern round the interior of the base—the so-called 'rouletted ware'—form a part of the equipment of this culture at Chandravalli and at Brahmagiri. At the former site probably and at the latter site definitely, they occur down to the lowest stratum of the culture. This rouletted ware was dated in 1945 at Arikamedu (Pondicherry) by its association with imported Arretine ware of the second quarter of the first century A. D. Moreover, the very distinctive rouletted pattern, which is otherwise foreign to Indian ceramic, is characteristic of Arretine ware and was certainly derived in India from it. The Indian rouletted ware is therefore in origin unlikely to be earlier than the first or second quarter of the first century A. D.; and, if the evidence of our two sites is typical, the Andhra Culture in which it occurs there cannot itself be of earlier date. Without any large margin of error, the beginning of the culture (at these hinterland sites) may be ascribed to a date little, if at all, earlier than the middle of the first century A. D. This dating is on historical grounds sufficiently probable; the period seems to have been one in which the Satavahana power in Andhradesa was in the ascendant.........' (Wheeler, 1947—48, 200). For dating the upper limit, the pottery of the megalithic fabric intermingled with typical Arikamedu pottery of the early or middle first century A. D. discovered by J. M. Casal at Arikamedu has also been referred to as one of the supporting evidence (Wheeler, 1947—48, 273, 274, 300).

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*Wheeler (1959, 163) later on modified the lower date-limit to c. 300 B. C.

The lower date-limit of the Megalithic culture at the site is depended mainly upon the computed duration of the stratified accumulation of 3-4 feet of occuration-soil.[1] Wheeler, estimating some two centuries for the above accumulation and considering the evidence in the light of historical context, dated the arrival of the Megalithic folk at the site around 200 B. C. (or a little later).

Stratigraphically, here ,the Megalithic deposits are preceded by those of the Neolithic, termed as the occupation of the Stone Axe Culture, with an overlap between the two. But there is no cultural transition, as the excavator observes, from the earlier culture to the later. Culturally, the two are said to be different to each other for the earlier one is represented by "crude equipment consisting of polished stone axes, miserable little blades and points chipped from scraps of felspar and the like, hand-made pottery mostly of the roughest and coarsest kind, and practically no metal[2] (certainly no iron)..." while the later one presents "a culture richly provided with iron weapons and tools... a well-made ceramic turned on the (slow) wheel, beads of gold and faience, glass bangles."

At Sanganakallu Subbarao (1948, 3) observed three distinct culture-sequence. On the top was the beginning of the Megalithic designated as Phase III. It was found to have overlapped with the upper phase of the preceding Neolithic culture. Sankalia (IAR, 1964-65 I-55; Ansari, 1969,3, 28) re-examined the site after a long gap of roughly sixteen years. He also found an overlap between the Neolithic and the Megalithic cultures. A thin topmost deposit of the overlapping phase, measuring 30 cm., is represented by the occurrence of hand-made Neolithic wares side by side with the typical wheel-made Megalithic, i.e. highly burnished Black-and-red ware, red ware and all-black ware. It may be noted that sherds of wheel-made pottery and a few copper objects[1] have also been recovered from Phase II[2] at the site (Ansari, 1969, 27, 3). The excavator observes that "compared to the other wares, megalithic wares are of negligible quantity" (Ansari, 1969, 28). By implication it appears that during the overlapping phase the preceding culture was not a dead force.

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[1] The discovery of a bronze coin from one of the megalithic tombs at Sulur by W H. Tucker, which was identified by J Allan as a coin of Eran struck in the third or second century B C. has also been referred to for dating the lower limit (Wheeler, 1947-48, 300).

[2] It may be noted that copper and bronze objects comprising rod, flat axe and finger ring have been found in the upper level (Sub-phase I B) of the Stone Axe Culture designated as Phase I (Wheeler, 1947-48, 202, 267, 269).

Sengamedu, a Megalithic habitation site in district South Arcot, Madras, has brought to light an accumulation of 9 ft. yielding the typical Megalithic Black-and-red ware[3] below a deposit in which this ware was found intermingled with the rouletted ware of the finer variety. The rouletted ware "dated from about 50 B.C.

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[1] The occurrence of copper in Phase II of Period III at Sanganakallu has not been reported in the "Indian Archaeology, A Review" (1964-65)—the only authentic source of information that was available prior to the publication of report on excavation at Sangankallu. Consequently, it led to the present author to surmise that metal was absent in both the phases of the Neolithic occupation at the site (*supra*, p. 18). The earlier relevant statement mentioned on page 18 of the present work may be rectified in the light of the informations as given in the subsequent report on Sanganakallu (Ansari, 1969, 3). But in this connexion it may be noted that the occurrence of copper objects in Phase II is probably very negligible, it is why they have neither been described nor their exact find-spots have been furnished in the detailed report—only a casual reference has been made.

[2] The number of the Phase has been expressed both in Roman as well as in Arabic by the excavator. In order to avoid confusion it may be mentioned that we have followed in the present work the former expression, i.e. Phase 'II'.

[3] The excavation also revealed the remains of burnt-brick structures used by the folk who made the Black-and-red ware (Banerjee, 1956, 52).

to AD. 200”, appears at the site after the accumulation about 9 ft. in which the Black-and-red ware dominated. Banerjee (1956, 32) observes that “if the thickness of a deposit can be an index* of the time taken in its formation, a fairly early date, possibly anterior to circa 200 B. C., is indicated for the initial appearance of the Black-and-red ware industry at the site”.

Maski (Thapar, 1957) is another important Iron Age Megalithic site which corroborates the archaeological dating of Megalithis as arrived at Brahmagiri. At Maski we have the Megalithic monuments of various types with some new features, as well as the regular habitation deposit which was found in association with some other cultures. The Megalithic occupation (Period II) of 4 to 5 ft. thick deposit is preceded by the Chalcolithic one (Period I) of about 3 ft., and is succeeded with an overlap by the Early Historical deposit (Period III) of nearly 2 ft. thickness. A distinct break in occupation has been noticed at the end of Period I (Thapar, 1957, 11). Period II, i e. Megalithic, is represented by the sudden emergence of the megalith-building people and the introduction of iron. The discovery of an etched carnelian bead from the late level of Period II is significant from the point of view of dating. The main ceramic industries comprise the typical Megalithic Black-and-red ware, the all-black ware and the red-slipped ware. Five classes of burials are reported. A few striking features of the burials observed by the excavator deserve special attention.

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*How far the computed duration of the stratified accumulation can function as scientific index of the time-scale may be judged from some of the following data :—

Wheeler (1947-48, 201) estimates some two centuries for 3-4 feet of Megalithic occupation at Brahmagiri; Banerjee (1956, 32) proposes about three centuries for the accumulation of about 9 ft. at Sengamedu; Thapar (1957, 17, 20) suggests some more than two centuries for 4-5 ft. deposits of regular Megalithic occupational strata, and about six centuries for 3 feet Chalcolithic occupational deposit at Maski; Lal (1654 55, 23) assigns about three centuries for 7 feet accumulation at Hastinapur.

Mention may be made of the occurrence of burials in the habitation-area itself; the inhumation of the complete skeleton in an extended position; and the north-south orientation of the major axis of the grave-pits. Among the finds of Period III (Early Historical), the occurrence of Russet-coated Painted ware or the Andhra painted ware, the occasional occurrence of rim-fragments of the beaked dish on the basel of which the rouletted decoration is applied, the sherds with black-and-red effect, and the etched beads of carnelian and agate, are noteworthy from the dating point of view.

The upper date-bracket of the Megalithic deposit at the site essentially depends on the relative position of the occurrence of the Russet-coated Painted ware and the 'beaked dishes' in the strata of Period III, on the one hand, and the recovery of an etched carnelian bead from a late level of Period II, on the other. The characteristic 'beaked dishes' with or without rouletted pattern occur only in the middle and late levels of Period III while the Russet-coated Painted ware occurs also in the lowest stratum, indicating thus a priority of the latter ware to the 'beaked dishes'. On the basis of these evidences the beginning of Period III has been suggested to the middle of the Ist century A. D, if not a little earlier. From Period II, as referred above, the only reasonably datable find is an etched carnelian bead, ascribable to the first century A.D. Considering the entire evidences together the end of Period II has been dated to the first half of the first century AD. The lower date-bracket, as at Brahmagiri, depends exclusively on the computation of the thickness of occupational strata which is represented by 4-5 ft. accumulation at the site for the Megalithic habitation. The excavator has assigned about more than two centuries for the above accumulation and has dated the beginning of Period II to circa 200 B. C. with a margin of a century on the earlier side.

After Maski a fairly good number of Megalithic monuments as well as the habitation sites have been excavated and they have their own significance, but we will touch in our survey only those, particularly the habitation sites, which have some especial significance from the point of view of chronology.

T. Narsipur (IAR,1958-59, 133; 1959-60, 38; 1961-62, I-59) is a multi-culture site where the Megalithic deposit is preceded by the Neolithic. It may, however, be pointed out that the upper level of the Neolithic is represented by the Chalcolithic elements at the site. Besides the occurrence of wheel-turned pottery and the painted black-on-red ware, a fragment of typical Jorwe ware is also reported from the upper level. The Megalithic deposit is mainly characterized by the polished black ware, Black-and-red ware both plain and with graffity, and iron.

At Kesarpalli (IAR, 1961-62, 1, 2), District Krishna in Andhra Pradesh, the Megalithic deposit is interlocked with the preceding Chalcolithic one. The Chalcolithic layers are represented by black-slipped, black-and-red and grey wares showing affinities with the Chalcolithic material from sites in central and western India, but it may be noted that the painted pottery is entirely absent. The Megalithic occupation is marked by the appearance of iron and Megalithic pottery. It is significant that a few shapes of the black-and-red ware found in the Chalcolithic deposit continued for sometime in Period II (Megalithic).

Paiyampalli (IAR, 1964-65, I-38 ff.), District North Arcot, Madras, also shows a distinct overlap between the Neolithic and the Megalithic cultures. The overlap is evidenced by the co-occurrence of the burnished grey ware and the Megalithic Black-and-red ware along with ground stone axes. The excavator thinks that the ground stone axes continued in use during the Megalithic period as well. The Russet-coated Painted ware appears in the late levels of the Megalithic deposit.

The digging at Uraiyur (IAR, 1964-65, I-45, 46; 1965-66, I-51), District Triuchchira, Madras, has brought to light the typical Megalithic Black-and-red ware in association with the Russet-coated Painted and Arretine wares in Period I. A few potsherds bearing Tamil inscription in the Brahmi script, assignable to the first-second century A.D. are noteworthy.

At Hallur (IAR, 1964-65, I-57, 58) also there is an overlap between the upper Neolithic and the Megalithic cultures. The overlap is evidenced by the use of Neolithic pottery and stone tools along with the Megalithic assemblage. The Megalithic character in the overlap phase is mainly represented by the occurrence of Black-and-red ware and iron implements. The recovery of Black-and-red ware with the white painted decoration from this phase is very significant. The upper Neolithic deposit has witnessed the continuance of the coarse brown-and-black ware of the lower Neolithic as the main ceramic industry of the Period. However, the burnished grey and the pale grey wares of the earlier period also occur in diminishing order. The occurrence of a few sherds of the black-painted red ware is noteworthy.

From Halingali (IAR, 1965-66 I-64), District Bijapur, Mysore, the fragments of the Neolithic-Chalcolithic grey ware found in one of the Megalithic burials are interesting.

Some of the post-Brahmagiri evidences led several scholars working on the problem of the Indian Megaliths to think afresh about the chronology, particularly the lower-bracket of the Megalithic culture which was less securely dated. Banerjee (1956, 32, 34) hinted long ago that in the light of the evidences of Sengamedu (mentioned above), Chingleput with crude monuments, and also in the context of Western Megaliths which have several structural features identical with their south Indian counterparts, a date earlier than c. 300 B.C. may have to be looked for for the introduction of megalithism in India. Later on he (Banerjee, 1965a, 177-199; 1965b, 40-67; 1966, 163-175) made a strong case for its earlier beginning resting mainly upon the early dating of the Neolithic-Chalcolithic cultures of the Deccan which has receded considerably during the post-Brahmagiri phase, on the one hand, and the relationship between the Indian Megaliths of the Iron Age and the cairn-builders of Baluchistan and Persian and Baluch Makran, on the other. He considers the cairn-builders of Baluch Makran as the probable source of the Indian Megaliths, who imbibed and continued the ceramic tradition and also some aspects of the burial customs of the Indian Chalcolithic cultures of an end-phase or even a post-Chalcolithic phase. In connexion with the hypothesis of adoption and adaptation of some of the cultural traits of the Chalcolithic folk by the cairn-builders in course of their march, he cites the evidences of Bahal, Tekwada (both in Maharashtra), Nagda and Ujjain (both in Madhya Pradesh) etc. Considering all the evidences in length, he concludes that "the chronological extent of the cairn-burials, taking its initial date back to circa 800 B. C,[1] accords well with the end-phase of the Chalcolithic culture extending up to circa 800 B.C.,[2] as well as with the succeeding Iron Age culture at Nagda and Ujjain, namely, circa 750 B.C., and sets the possible lower limits, in harmony with the attendant evidence, for the introduction of the megalithic cult into India. The time factor involved in its southward movement may account for a hundred years, and point to the date of its introduction there arond 700 B. C." (Banerjee, 1965 b, 66).

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[1] Agrawal (1965e, 200 points out that both Schaeffer' revised dates and C-14 dates suggest that Sialk VI B, on which the dating of cairn-burials of North-West rests, is datable to c. 1200-1000 B. C. and not to c. 800 B. C.

[2] On the basis of our investigation in the C^{14} evidence (*supra*), the end of the Chalcolithic period in central India takes place in about 1400 B. C. and not in circa 800 B. C.

Thapar (1957, 19) has also pointed out that Sengamedu and Amravati[1] have some objective evidence for an earlier dating of the Megalithic culture in the southern Deccan than has been proposed for Brahmagiri.

Deo (1969, 35) has recently observed that the Megalithic remains in Vidarbha-Maharashtra region have to be assigned to at least the beginning of the first millennium B. C, if not earlier. On the basis of the evidence at Tekwada Bahal IB complex where Megalithic pottery was found associated with a Jorwe pot[2], the dating can safely be pushed back to the earlier half of the first millennium B. C. The earlier dating for the beginning of Megaliths is indicated also at Kaundinyapur[3] (IAR, 1960-61, 2 , 30). Here Period I is "capped by Period II in which the Black-and-red ware continues and the horizons of which show a sterile deposit." The succeeding Period III yields N.B P. ware. In addition to these, he has (Deo, 1972, 7, 8) drawn our attention to the evidences of Takalghat, Khapa and Mahurjhari, all in eastern Vidarbha, which can also be dated to about 700-800 B. C.

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[1] At Amravati, District Guntur, Andhra Pradesh, a stupa was found lying over Megalithic urn-burials (Rea, 1912, 88-91). From the stupa area the NBP ware is also reported (IAR, 1953-54, 38).

[2] At Brahmagiri also, "as has been pointed out by Subbarao and others, the shapes in the black-and-red ware found in deposits preceding the construction of two of the megalithic cists are comparable with those from Tekwada. Alongside, there also occurred a specimen of the black-on red ware" (Lal 1960, 22).

[3] The excavator has dated the Megaliths of Kaundinyapur to c. 2000 B. C. which is too liberal to concede to. However, Deo (1972, 7) has pointed out that the occurrence of micaceous red ware in the first habitation at the above site, and also at Paunar and Pauni from the pre-NBP ware levels, is significant in respect to the date of the Megalithic sub-stratum in this region.

Sarkar (1969, 23) on the basis of stratigraphical evidence of Yeleswaram and Kesarpalli, tentatively, ascribes the Megaliths of the lower Krishna valley to about the middle of the fifth century B. C.

The evidences showing prolongation in Period II (Megalithic), for sometime, of a few shapes of the black-and-red ware found in the Chalcolithic deposit at Kesarpalli (IAR, 1961-62, 1, 2), the continuance of some of the Neolithic traits in Megalithic-Neolithic overlap phase at Paiyampalli (IAR, 1964-65, I-38 ff.), on the one hand, and the occurrence of the white painted black-and-red ware from Megalithic-Chalcolithic overlap phase at Hallur, on the other, are highly significant from the point of view of earlier dating of the lower-bracket of the Iron Age Megalithic culture.

Turning, now, to the Megaliths of Northern group, it is a too known fact that the north and the north-west regions have never been completely devoid of megaliths. Long ago, they were noticed in the neighbourhood of Karachi. Besides, they were also repoted from the hilly districts of Almora and Mirzapur in U. P., Deosa in Rajasthan, hilly-range of Orissa and also from the Leh valley of Ladakh (Wheeler, 1959, 159-60). But they do not provide anything meaningful for dating purposes. In recent years, however, the Megaliths of Northern region have been placed on better footing with more informations. A large number of monuments mainly cists and cairn-circles have been brought to light at the outcrops of the Vindhyas in the districts of Banda, Allahabad (IAR, 1962-63, 32), Varanasi, (IAR 1961-62, 53; 1962-63, 32) and Mirzapur (IAR, 1962-63, 32, 38). Some of the excavated sites throw welcome light on the problem of the chronology of Indian Megaliths. Mention may be made of Kotia (IAR, 1963-64,I-63) and Kakoria (IAR, 1962-63, 39; 1963-64, I-85) situated on the rivers Belan (Allahabad) and Chandraprabha (Varanasi) respectively. On the basis of archaeological evidence the Megaliths of Kotia which are associated with iron have tentatively been placed between c. 8th-4th century B. C. (IAR, 1963-64, I-65) The evidence of Kakoria is significant as a large number of microliths have been recovered from the habitation area and a few also from the excavated monuments. Some of the pottery shapes, occurring both in habitation as well as in burials, are comparable with the Chalcolithic horizon of central India, on the one hand, and northern India especially Atranjikhera and Chirand, on the other. The iron is completely absent. The Kakoria group of megaliths of Uttar Pradesh has been ascribed to the Chalcolithic-Megalithic period.

Curiously enough the antiquity of the Iron Age Megaliths has fairly receded in the recent years, touching almost the end-phase of the Neolithic-Chalcolithic. Some of the elements of the former found together with those of the latter at Hallur, Sanganakallu, Brahmagiri, Paiyampalli etc. may be pointed out. The actual overlap between the two at several sites is noteworthy. It is needless to emphasize the relationship of some of the Megalithic burial customs with those of the Neolithic-Chalcolithic. Allchin (1968, 129) has rightly observed that some of the south Indian Megalithic burials appear as developments of the indigenous Neolithic-Chalcolithic burial customs of the Deccan. All these factors provide a new perspective to visualise a still more closer relationship between the Megalithic and Neolithic-Chalcolithic cultural milieu.

In the following section we will examine the radiocarbon dates which are available for some of the excavated Megalithic sites

C^{14} DATES SCRUTINIZED

We have six sites* that provide radiocarbon dates, the four viz. Halingali, Hallur, T. Narsipur (Mysore) and Bainapalli-Paiyampalli (Tamilnadu) belong to the southern group, and the remaining two viz Kotia and Kakoria (Uttar Pradesh) to the northern one. The data at our disposal for the individual site are not sufficient, generally they are represented by a single date. The sites which are comparatively better represented their samples, barring a few, mostly suffer from cases of high contamination. The site-wise examination of the avilable C^{14} dates are as below.

Halingali

For Halingali only one date TF. 685 reading 80 ± 100 B. C. (TIFR Date List, 1967b, Dec.) is available. The sample has been derived from Meg. III at a depth of 0.130 cm.-0.150 cm.

It is not possible to examine its validity in respect to consistency for there is a single date.

Hallur (Lat. 14° 20′ N., Long. 75° 37′ E.)

From Hallur no radiocarbon date is available for the pure Megalithic phase. The two reported dates TF. 570, 1105 ± 105 B.C. and TF.573, 955 ± 100 B.C. (Agrawal, 1966c, 585-86) belong to the Megalithic-Neolithic overlap phase. Besides these, we have one more date TF. 575, 1030 ± 105 B. C. (Agrawal, 1966c, 585-86) which belongs to the late Neolithic, representing a phase just prior to the arrival of iron-using Megalithic people at the site. These dates have already been examined in Chapter II (*supra*). It may, however, be mentioned here that in the light of these dates the lower limit of the Megalithic-Neolithic overlap phase can be fixed around 1000 B.C. at the site.

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*In addition to these six sites some C^{14} dates are reported for the upper horizon of the mid phase of the Megalithic habitation at Takalghat (Deo, 1972, 7) but they could not be incorporated here as the required details could not be accessible to the present author.

T. Narsipur (Lat. 12° 13′ N , Long. 76° 55′ E.)

We have only one C^{14} date, TF. 414 reading A.D. 1725 ± 90 (Agrawal, 1966c, 585-86), for the Megalithic deposit at the site. The sample has been derived from layer 3A at a depth of 0.67m. which has provided almost a recent date.

Bainapalli-Paiyampalli (Lat 12° 33′ N., Long. 78° 27′ E.)

There are three C^{14} dates—TF. 350, 380 ± 105 BC. (Agrawal, 1966c, 585 86); TF. 828*, 210 ± 100 B. C. and TF. 823*, 640 ± 105 B.C.—which may be considered for dating the Megalithic deposits at the site. TF. 350 is reported to have belonged to the post-Megalithic, and TF. 828 and TF. 823 to the Megalithic phase.

While examining the position of their consistency in respect to stratigraphic profile it may be pointed out that inwant of the details pertaining to their corresponding inter-stratigraphic relation, on the one hand, and the same relationship of the last two dates with the preceding culture with which the Megalithic deposit is interlocked, on the other, it is somewhat difficult to deduce any positive evidence to date the horizon. However, barring TF. 828 (210 ± 100 B.C.), the remaining two dates TF. 350 (380 ± 105 B. C.) and TF. 823 (640 ± 105 B. C.) seem to be fairly consistent. In the light of present evidence based on

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*Quoted from the paper *Radiocarbon Chronology in Indian Prehistoric Archaeology* (D. P. Agrawal et alia), submitted to the Jour. of the Asiatic Soc. of Bombay.

limited informations which are available regarding the details, the Megalithic deposit at the site may provisionally be placed between c. 600-400 B C.

Kotia(Lat 24° 55′ N., Long. 82° 25′ E.)

Form the Iron Age Megalithic monuments at Kotia five samples—TF. 318, TF. 319 (TIFR Date List, 1966a, May); TF. 320, TF. 321 and TF. 322 (TIFR Date List, 1966b, Aug.)—have been measured. They belong to Meg I, Meg. II, Meg. IV, Meg. V and Meg. VA respectively. Meg. VA is said to have been slightly earlier than Meg. I and II. Archaeologically, they have tentatively been placed between c. 8th-7th century B. C. to 5th-4th century B. C. The radiocarbon determinations read A. D. 1725±100 for TF. 318, 250±105 B. C. for TF. 319, A. D. 1460±100 for TF. 320, A. D. 955±100 for TF. 321, and A. D. 1365 ±100 for TF. 322.

It is obvious that except TF. 319, the rest are highly contaminated. Agrawal (1968c, 13) comments that "this could be possible only if modern charcoal were mixed with the samples. Natural contamination of this magnitude is ruled out." However, the date of sample TF. 319 derived from Meg. II, within one standard deviation, seems to be more or less in conformity to the upper limit as proposed by the excavator. But it needs confirmation by more dates.

Kakoria (Lat. 25° 3′ N., Long. 83° 11′ E)

It is a Chalcolithic-Megalithic site. From the habitation area two samples—TF 179 (Agrawal, 1966 a, 4, 5) and TF. 183 (Agrawal, 1965a, 42, 43) derived from Pit E SB. layer 1, and layer 4 respectively—have been dated. The C^{14} dates read A. D. 1750±95 for TF. 179 and A. D. 1745±100 for TF. 183. They provide almost modern age*.

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*The excavator had indicated the possibility of having mistaken old black roots for charcoal while collecting samples at the site (Agrawal, 1965 a, 42, 43).

FINDINGS

At the outset it may be stated that the available C^{14} dates for the Megalithic culture are not adequate for building any firm C^{14} based chronology. They have practically nothing to hint at the typological chronology[1]. Most of the samples at our disposal are either highly contaminated (TF. 414, TF. 318, TF. 320 TF. 321, TF. 322, TF. 179, TF. 183) or of almost neutral value. The three samples belonging to Hallur (TF. 573, TF 570, TF. 575), two to Bainapalli-Paiyampalli (TF. 350, TF. 823), and one to Kotia (TF. 319), are to some extent dependable. On the basis of their dates the Iron Age Megalithic culture in general can provisionally be dated to ranging from c. 1000 B. C. to c. 300 B. C. It must, once again, be emphasized that in view of the paucity of ideally valid data the above bracket remains extremely provisional, especially the upper one.

The lower bracket reading about 1000 B. C., as indicated by the dates of Hallur which are fairly consistent with the stratigraphic sequence, is however significant in several ways. First, it tends to push back the antiquity of the Iron Age Megaliths to an extent touching almost the end-phase of the Neolithic-Chalcolithic cultures, and consequently paves the way for visualising a closer relationship between the two. Secondly, it creates a difficult barrier against the thesis propounded by Banerjee that the southern Megaliths were inspired by the cairn-builders of Baluch Makran region, whom he has dated to around 800 B. C. Thirdly, it raises some important problems pertaining to the authorship, antiquity and the introduction of iron in India. Till now only one source, i.e. P.G. Ware of the Ganga-Yamuna Doab datable to c. 1000 B. C., for the initiation of iron in India was known to the Indian archaeology, the C^{14} evidence of Hallur has provided a clue to a new source. Similarly, the question of the origin of megalithism has also acquired a new perspective in the light of above evidence. Allchin (1968, 229) has pertinently observed that "the south Indian graves appear as a developing complex with several streams of influence combining in them." The pre-Iron Age megaliths of Kakoria group associated with microliths also seem to have represented one of the streams.

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[1] Attempts to determine the typological chronology of the Iron Age Megaliths by Dikshit (1969, 6-8) and Sundra (1972) are appreciable, more work on this line is highly needed.

Lastly, the initial date for the Iron Age Megaliths as deduced from the dates of Hallur throws some significant light also on the problem of the relationship between the plain Black-and-red ware associated with iron and found at the sites of southern, central and western India in the context of Megaliths as well as the Early Historical, on the one hand, and the painted black-and-red ware of the Chalcolithic context, on the other. The occurrence of the white painted black-and-red ware in the overlapping strata of the Megalithic-Neolithic deposits at Hallur for which we have C^{14} dates certainly presents the objective evidence for showing a significant link of the Megalithic Black-and red ware with that of the Chalcolithic. But on this basis alone we are not justified in propounding any reasonable hypothesis pertaining, firstly, to the similar link in every regions mentioned above, and secondly, to the pasting of Megalithic label to all plain Black-and-red ware of the regions. To the latter, Thapar (1957, 64) has already pointed out "that before ascribing this ware (Black-and-red ware) to any particular culture, the associated industries as well as the region of occurrence must be taken into consideration.....A note of caution is, therefore, necessary lest all black-and-red ware be taken to belong to the megalithic culture". In the light of radiocarbon evidence, the views often expressed in a very generalised form showing cultural link—especially in respect to the black-and-red ware—between the Chalcolithic and the Early Historical and/or Megalithic at every allied sites, do not seem tenable.

The following observations primarily based on C^{14} evidence may be noted In addition to Hallur there are four other dated sites Nevasa, Navadatoli, Eran and Ahar which have furnished the closing dates to the Chalcolithic phase at respective sites. They have yielded plain Black-and-red ware associated with iron from the period that succeeds the Chalcolithic. In the preceding Chalcolithic period, excepting Hallur[1] and Nevasa[2], the rest have witnessed the painted black-and-red ware. At Hallur the end of Chalcolithic vis-a-vis the beginning of Megalithic have been dated to c. 1000 B.C. on the basis of radiocarbon evidence (*supra*, p. 40). The Chalcolithic phase at Nevasa closes around 1200 B. C. on empirical dating (*supra*, p. 102). A considerable gap has been noticed at Nevasa between the Chalcolithic and the plain Black-and-red ware deposits. At Navdatoli the end of Chalcolithic culture has been dated to c. 1400 B. C. or a little later (*supra*, p. 91). Here a gap,[3] roughly of 800 years between the Chalcolithic and the succeeding Early Historical deposits, is indicated on the basis of both the C^{14} and archaeological evidence (*supra*, p. 94ff). The Early Historic deposit has yielded plain Black-and-red ware which the excavator has described as of Megalithic semblance. It has also witnessed the sherds of N.B.P. Ware. Eran has also the plain Black-and-red ware with iron and N.B.P.

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[1] At Hallur the painted black-and-red ware occurs in the overlapping phase.

[2] At Nevasa a single black-and-red sherd without painting is reported from the Chalcolithic horizon (Sankalia, 1960, 211, 238, 240).

[3] According to the excavator both the periods are interlocked.

Ware in the Early Historical period that succeeds the Chalcolithic associated with the painted black-and-red ware. Here also the end of Chalcolithic phase has been dated to c. 1400 B. C. on C^{14} evidence (*supra*, p. 93). A similar gap as at Navdatoli seems to be most likely also at Eran.[1] At Ahar the plain Black-and-red ware with iron occurs in Period II. The preceding Chalcolithic phase Ic is represented by the painted black-and-red ware. The upper limit of the Chalcolithic phase dates around 1300 B. C. on empirical dating (*supra*, p. 83) A gap[2] roughly of 700 years is indicated also at Ahar on C^{14} evidence (*supra*, p. 86)

In the light of C^{14} dating, as pointed out above, two sets of evidence come in relief in respect to the relationship between the plain Black-and-red and the painted black-and-red wares. The first set of evidence shows that the painted black-and-red ware co-existed with the Iron Age plain Black-and-red ware in the peninsular region around 1000 B. C. The second set of evidence reveals that there was a considerable gap between the two in the regions of Jorwe (?), Malwa and Banas cultures. By implication, the above combined evidence would probably suggest that the painted black-and-red ware played its role, if any, in respect to the plain Black-and-red ware, earlier in the peninsular region than that of, comparatively, the northerly one. Such forthcoming indications from both the archaeological as well as C^{14} evidences certainly present some serious anomaly. It is really surprising as revealed by C^{14} evidence that the painted black-and-red ware did not come in direct contact to the plain

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[1] The available C^{14} dates (TIFR Date List, 1966b, Aug.), TF. 324, 1250±110 B. C. (layer 14) and TF. 326, 1040±110 B. C. (layer 16) belonging to Period IIa following the Chalcolithic deposits at Eran are not consistent. They are significant but need confirmation.

[2] According to the excavator both the periods are interlocked

Black-and-red ware at some of the important sites situated in the epicentre region, of the former ware, or to its proximity, while the contact is represented, shown also by C^{14} evidence, at those situated in considerably far off region. In the absence of direct contact between the two in epicentre region of the former ware, the question of the antiquity and the introduction of the plain Black-and-red ware as well as iron in western and central India invites some other possibilities. Any conclusive answer, undoubtedly, needs more field work and still more C^{14} dates. However, at present state of our knowledge the arrival of plain Black-and-red ware as well as iron in the above regions seems to be comparatively later than that in the southern and northern India. Archaeologically, we cannot afford to ascribe them beyond 7th-6th century B. C. at least at Ahar, Navdatoli and Eran where a gap between the Chalcolithic and Early Historical periods is indicated by C^{14} evidence. The picture would be clearer when some valid C^{14} dates become available also for the Early Historical period at these sites. In northern India the emergence of iron can safely be dated around 1000 B.C. or a little younger. The dating of the plain Black-and-red ware anterior to that of iron is evident in this region. In southern India the both can firmly be dated around 1000 B. C. on the basis of archaeological as well as C^{14} evidence. Under these circumstances, it is pretty difficult to assess whether, the northern or the southern India, introduced the plain Black-and-red ware and iron to the people of central and western India. However, in the light of the facts, first, that the antiquity of the plain Black-and-red ware is deeper in the former region, and secondly that iron at the sites of the central and western India occurs generally in the N.B.P. Ware (rarely in pre-N.B P.) context along with plain Black-and-red ware, the northern India appears to be a better claimant. But before drawing any positive conclusion a thorough investigation into the typological relationship of the pottery of the above regions is highly needed on the line as recently suggested by Sankalia.

CHAPTER VI

P.G. WARE CULTURE

Prior to the excavation at Hastinapur our knowledge about the chronological frame of the early cultures, of the northern India, in general and of the P.G. Ware culture in particular was extremely limited. The all we knew were broadly confined to the Harappa culture ending around c. 1500 B. C. and, after a big gap, the Early Historical culture represented mainly by the N.B.P. Ware ascribable to about 4th/5th century B. C. This millennium years long gap was a real Dark Age of the Indian archaeology.

In the early fifties Lal's (1954-55) digging at Hastinapur made a lasting contribution by offering, for the first time, a firm stratigraphical context as well as the chronological horizon to the P.G. Ware culture which provided a dependable clue to further researches in the problem of the Dark Age. Stratigraphically, at Hastinapur, the P.G. Ware designated as Period II was found to have preceded by the Ochre-coloured ware*, Period I, with a break in between and succeeded by the N B P Ware deposits, Period III, after a considerable lapse of time. The seven feet accumulation in Period II is characterized by the typical P G. Ware, mostly wheel-made and invariably thin in section. The shapes represented are mainly straight-sided bowls, cups and dishes with incurved sides and sagger-or convex base. The surface of the body is painted in black executed before firing. The associated ceramic industries comprise the brownish-red with a grey core and painted in deep chocolate or black, the grey ware, the red ware, and the black-slipped ware. Some sherds of the Black-and-red ware belonging to the black-slipped ware variety are also reported. The other noteworthy finds include copper objects, terracotta bull (?) and horse (?), a fragmentary burnt brick, and rice. Iron ore and slags are reported from the uppermost levels* of the Period. The succeeding Period III, distinguished by the N.B.P. Ware, begins after 'large-scale' flood which washed away a considerable portion of the deposits of Period II.

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*Henceforward the Ochre-coloured ware is referred to as O.C. ware.

Depending upon the then available archaeological data supported by the carefully analysed literary evidence the excavator provisionally placed the P.G. Ware culture ranging from c. 1100 to c. 800 B. C. at the site. The upper date-limit of the proposed bracket rested mainly on the dating of N.B.P. Ware (*infra*)and the estimate for the duration of the flood." ....A heavy flood in the Ganga washed away a part of the settlement of Period II and that the third occupation came into being after an appreciable lapse of time. During this interval the people had completely given up the Painted Grey Ware and had developed instead the Northern Black Polished Ware. The plain grey ware had also degenerated to a considerable degree and several new forms had come into being. Mud-bricks were replaced by burnt bricks, iron had come into use and a system of coinage introduced. All this change would have certainly required a couple of centuries. Thus, since the lowest level of Period III is assignable to the early sixth century B. C., it is unlikely that the flood could have occurred later than the beginning of the eight century." The lower limit is based on the computation for the duration of 7 feet regular occupational strata belonging to the Period. In the general context of the site some three centuries were estimated for the accumulation of these strata, and consequently the lower limit of the Period was assigned to c. 1100 B. C., with a probable margin on the earlier side.

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*The small scale excavations conducted at Hastinapur, in 1962, have yielded iron objects from the mid levels of the P.G. Ware deposit (Banerjee, 1965b, 216).

Besides Hastinapur, a number of P.G. Ware sites belonging to the central as well as the peripheral regions have been excavated. Mention may be made of Rupar, Alamgirpur, Ahichchhatra, Atranjikhera, Noh, Kausambi, Sravasti etc. Some of them have also added a few significant new informations in respect to chronology and stratification of the P.G. Ware culture.

Rupar (IAR, 1953-54, 6), District Ambala, has brought to light the P.G. Ware from the stratified context but the details of its associated ceramic industries are not available. However, the lower limit of the phase has been assigned to c. 1000 B.C. The ware is said to have continued for about three centuries at the site. The succeeding occupation commencing from the middle of the first millennium B.C. is characterized by the use of N.B P. Ware.

At Alamgirpur (IAR, 1958-59, 50-55), District Meerut, the P.G. Ware deposits are designated as Period II. The preceding Period I is Harappan and the succeeding Period III has been called the Early Historical. A break in between all of them is reported. Period II, with an average thickness of 4½ feet, is characterized by the occurrence of P.G. Ware, black-slipped, Black-and-red and plain red wares. Besides copper, iron objects also occur. The excavator observes that the low percentage of the P.G. Ware and the occurrence in the Period of certain ceramic types associated at Hastinapur and Rupar with the N.B.P Ware levels would point to Period II of the site as representing a late phase of the P.G. Ware culture, the supposition is strengthened by the occurrence of iron throughout the levels in the Period. The ceramics of Period III, while containing features also characteristic of the corresponding Periods of Hastinapur and Rupar, contain a few somewhat later features of those sites. The N.B P. Ware is absent in the Period.

At Ahichchhatra (IAR, 1963-64, I-68-72; 1964-65 I-73-75), District Bareilly, the P.G. Ware, Period II, is preceded by the O C. ware, Period I, with a break in between. The N.B.P. Ware deposit marked as Period III succeeds the P.G. Ware with an overlap*. The ceramic industries of Period II has, besides P.G. Ware, the brownish-red, the black-slipped and the plain red wares. Iron is also reported.

Atranjikhera (IAR, 1965-66, I-82-86; Gaur, 1965; 1969), District Etah, has an independent horizon of the black-and-red ware (Period II) lying below the P.G. Ware deposits (Period III). An earth filling of the P G. Ware period intervenes between the two. Period II is preceded by the O.C. ware deposits (Period I), again, with a break in between. The N.B.P. Ware (Period IV) succeeds the P.G. Ware deposits with an overlap. Period II has, besides the black-and-red ware, the black-slipped, the red-slipped and the red wares. The shapes in black-slipped ware are the same as in black-and-red ware. The black-slipped ware is occasionally painted with designs similar to those commonly found in the P.G. Ware. The tentative percentage of the various wares in the Period reads 21.15% (black-and-red), 31.10% (black-slipped), and 42.45% (red). The black-and-red pottery, as the excavator observes, shows affinities in fabric with the comparable pottery from Gilund and Ahar. Of the other finds, a few burnt fragments of bricks, cores of chalcedony and waste flakes are noteworthy.

Period III has, besides P.G. Ware, the Black-and-red, the black-slipped, the grey, and the red wares. The tentative percentage of the P.G. Ware, the Black-and red ware and the black-slipped ware reads 3.4%, 5.3%, and 15.6% in sub-phase I; 9.7%, 01.1%, and 01.1% in sub-phase II; 6.0%, 0.9%, and 2.0% in sub-phase III; and 1.4%, 0.1%, and 0.8% in sub-phase IV respectively In sub-phase I the black-slipped predominates the P.G. and Black-and-red wares. But in the subsequent three sub-phases the P.G. Ware predominated showing the percentage highest in sub-phase II. It, however, has sudden fall in sub-phase IV. The black-slipped and the Black-and-red wares fall tremendously right in sub-phase II, but in the next two sub-phases these two wares have gradual decline. The P.G. and the plain grey wares show a remarkable similarity in shape, fabric and technique to the black-and-red ware and the black-slipped of the earlier period.

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*The earlier excavation at Ahichchhatra Panigrahi, 1946, 59) has also indication of the overlap between the two wares.

The iron objects comprising spear-heads, arrow-heads, knives, axe, etc. are also reported. Period IV is characterized by the presence of N.B.P.

Noh (IAR, 1963-64, I-52-54; 1964-65, I-64, 65), District Bharatpur, has also brought to light an independent horizon* of the black-and-red ware, designated as Period II, at the site. The succeeding Period III is represented by the P.G. Ware which overlaps with the N B.P. Ware deposits (Period IV). Period I, the earliest at the site, is characterized by the O.C. ware. Period II has, besides the plain black-and-red, the black-slipped and coarse red wares. The excavator observes that "this black-and-red ware is quite different from that obtained from Ahar." Stone objects are not reported from this deposit. Period III is distinguished by the occurrence of the P.G Ware. The other associated ceramic industries of the Period are the black-slipped and the Black-and-red wares. Among other finds, copper, iron objects and charred rice are noteworthy. Period IV is represented by the emergence of the N.B.P. Ware and its associated ceramics. However, the P.G. Ware in a baser fabric is reported to have continued. The Black-and-red ware disappears.

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*In the latest excavations at Noh, 1970-71, no separate phase of the black-and-red ware was noticed (Dikshit, 1972, 6).

At Kausambi, District Allahabad, the P.G. Ware deposits have been designated as Period III* (Sharma, 1969, xiv–xvi). Period IV is N.B.P. Ware deposits that succeeds the former with an overlap. At the lower end the P.G. Ware is interlocked with Period II which has yielded sherds of Black-and-red ware, both plain and painted.

Period III has, besides the P.G, the Black-and-red, the black-slipped, and the red wares. The associated wares show similarity in fabric, texture and typology with those of "Atranjikhera III, Kakoria, Chirand IA-IB, Sonepur IA-IB, etc." The P.G Ware is represented mainly by bowls and dishes with their variants. The painted designs comprise simple horizontal bands, groups of vertical or slanting strokes, loops, circles, dots, etc. "A comparison of these types and painting designs with those from typical Painted Grey Ware sites like Hastinapur and Rupar and others in western U. P. and the Punjab, shows that Kausambi represents a late stage in the history of this ware" (Sharma, 1960, 58). In Black-and-red ware the shapes include dishes, bowls (?) and handi. A few sherds of this ware are also painted. The painted designs comprise dots, circle, circle of dots, etc. It may be noted that the P.G. Ware and also the Black-and-red ware continue to exist in early sub-periods of the N.B.P. Ware as well. The excavator observes that "the view of a gap between the end of the Painted

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*It was formerly designated as Period I (Sharma, 1958, XXXVII –XXXVIII) and subsequently as Period II (Sharma, 1960, 18). Recently it has been modified to as Period III (Sharma, 1969, xiii-xvi).

Grey Ware and beginnings of the N B.P. Ware is no longer tenable" (Sharma, 1960, 59). The discovery of iron objects from the P.G. Ware levels which remained in use throughout the Period is significant. Coins are also reported from Period III.

The P.G. Ware begins at the site in structural Period 5 and prolongs at the end of structural Period 9 in which the N.B.P. Ware makes its first appearance. The span of the P.G. Ware including the overlapping phase has been dated to from c. 885 to c. 535 B. C.

From Sravasti (IAR, 1958-59, 47-50), District Bahraïch, a few sherds of the P.G. Ware are reported to have occurred associated with the N.B.P. Ware in pre-defence habitation referred to as Period I. Certain sherds, as the excavator points, technologically representing a stage preceding the full-blooded N.B.P. Ware also occur in these very levels. Besides, "a few pieces of a ware having painted designs in buff or cream over a polished black surface" are also reported. The motifs consisting mainly of grouped vertical strokes are said to be reminiscent of some of those found on the P.G. Ware. The other associated ceramic industries comprise the black-slipped, the Black-and-red, thin grey, and plain red wares. According to the excavator "Period I might have begun not very long after the end of the Painted Grey Ware occupation at Hastinapur". It has been dated to from the second quarter of the first millennium B.C. to the end of fourth century B. C.

At Ujjain (Banerjee, 1965b, 5, 14) the P.G. Ware sherds occur in the make up of the rampart. A few are reported also from the earliest period of occupation, stratigraphically below the deposits of the cultural complex characterized by the N.B.P. Ware. Period I, the earliest at the site, has also witnessed iron objects. The ceramic industries comprise the Black-and-red ware, vesciculated ware, sturdy double-slipped ware, mat-impressed red ware, and unslipped red ware. The Period has been dated to c. 750-500 B. C.

Recently, the excavation at Allahapur (IAR, 1970-71; Dikshit, 1972), District Meerut, has shown that the P.G. Ware with same quality persists till the end which comes about the Mauryan Period at the site. It begins there in Phase IA. The associated ceramic industries comprise the Black-and-red, the black-slipped and the red wares. The basic forms in the Black-and-red ware are bowls with vertical sides and sharpened rim, and dish with an inturned featureless rim. This ware predominates the P.G. Ware. The black-slipped ware is very restricted in quantity. The red ware types are mainly represented by jars with splayed out rim. Phase IB has witnessed the P. G. Ware "alongwith the N.B.P. associated red ware types such as bowl-cum-lid, basin, deep bowl and jar... and other objects hitherto reported only from the N.B.P. levels .. The Painted Grey Ware fabric continued to remain fine and did not degenerate in the techniques of manufacture and painted designs as happened to other P.G W. sites." On the basis of the presence of some important elements of the N.B.P. Ware assemblage such as burnt bricks, antimony rods, terracotta discs and beads, bone arrow heads and a variety of iron objects in Phase IB, a longer duration for the P.G. Ware has been proposed. From the upper levels of this phase a terracotta sealing inscribed in the late Mauryan character is also reported. The excavator, on archaeological ground, assigns a duration for about 400-500 years to the P G. Ware culture at the site, and thinks that the "beginning of this culture cannot be pushed beyond c. 800 B. C." But he observes also that Allahapur may turn out to be slightly earlier than Hastinapur due to the preponderance of the Black-and-red ware over the P.G. Ware.

The publication of the *Provisional Conclusions* deduced from the excavation operated in a limited area at Hastinapur was really 'a storm in a teacup'. It was expected to create stir, that it did. But it also created problem of its own and invited further researches. Gordon (1954-55, 175) reacting sharply stated that "it seems unlikely that Painted Grey Ware can carry us back earlier than 650 B. C. and this I regard as optimistic." He (1957) restated that "It is doubtful whether Period III lasted more than 250 years, as there is nothing to account for a longer duration, the dating of the N.B.P. prior to 400 B C being highly debatable, and the terracotta figures all being 2nd and late 3rd century B. C Before Period III there is again a break following on the settlement in part washed away by the Ganges. Here, because the dating of the Painted Grey Ware back to 1100 B. C. fits a theory of Vedic origins, an unnecessarily long gap of 200 years is postulated when 100 at the outside would suffice, N.B.P. being clearly an extension of P.G. Ware with a new fashion of surface treatment. Lal's dates for the beginnings of Period II and III are 1100 and 580 B. C., but there is a good case, if not better, for substituting 700 and 350 B. C" In the subsequent publication also he maintained almost the same view (Gordon, 1958).

Wheeler (1959, 28) in the light of earlier evidence observed that "If the initial date of the N.B.P. Ware in the Ganges region be placed somewhere in the 5th century B. C., then the bulk of the P.G. Ware is certainly earlier than that date...the beginning of the P.G. Ware might be ascribed to the 8th century B.C." In view of later evidence, particularly of Atranjikhera he (1966, 98, 99, 113, 114) is inclined to modify his earlier view as he mentions that "the date of this urban culture....seems to have been about 1000 or 800 to 500 B. C."

Sharma (1960) contributing substantially to the problem of the relationship between the P.G. and N.B.P. Wares emphasized that the view of a gap between the two is no longer tenable. The P.G. Ware continued to survive along with the N.B.P. Ware as long as fifth century B. C. at least in the eastern part of the Ganga valley. Sinha has also pointed out the overlap between the two wares.

Agrawal (1968a) in the light of recent evidences proposed a shorter chronology for the P.G. Ware culture, ranging from c. 800 to 400 B. C. Revaluating the chronology as deduced by Lal he observes that the introduction of the N.B.P. Ware at the site seems to be fairly late, ascribable to c. 400 B.C., which reached there probably through diffusion; that the gap between Period II and III is unjustifiably inflated; that the view of temporal succession of the P.G. and N B.P. Wares is uncalled for. For the lower bracket he depends mainly on the C^{14} evidence. He further points out that "with the conclusive iron-association of the P.G. Ware goes away the aura of its high antiquity." Gaur (1968, 3,4,) on the other hand has pleaded for the early dating of the P.G. Ware culture essentially on the basis of one controversial* C^{14} date for Atranjikhera. Besides, he thinks that the P.G. Ware deposits lying immediately over the black-and-red ware are much earlier in context than the deposits which do not show such sequence and concludes that at sites such as Atranjikhera and Noh the P.G. Ware culture started somewhere in the 11th century B. C, if not earlier. He suggests that at Hastinapur the beginning of the culture in question may be placed later than at Atranjikhera and Noh.

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*It has been discussed in the subsequent section (*infra*).

C^{14} DATES SCRUTINIZED

There are five sites which provide radiocarbon dates for the P.G. Ware deposits viz. Noh, Hastinapur, Alamgirpur, Ahichchhatra, and Atranjikhera. We have about twelve dates.* Most of them belong to the late levels, for the early levels no date is available.

Noh

Two C^{14} dates are available for the P.G. Ware deposits at the site, UCLA-703A and UCLA-703 B reading 605 ± 260 B. C. and 820 ± 225 B C. respectively (Berger, 1965, 335). The correlated stratigraphic position of these dates is not clearly indicated. However, they are said to have belonged to the mid level of the deposits.

jIn the absence of stratigraphic details it is difficult to udge the relationship of these dates with the sequence. They may, however, be considered as consistent provided UCLA-703 A belongs to the higher stratum than UCLA-703B. The difference between the two is real with maximum level of confidence. If these dates, stratigraphically, represent the upper and lower limits of the mid phase, the span for the same would read about 200 years. And on the basis of this span some tentative idea may be formed about the late and the early phases of the P.G. Ware deposits. They would come *circa* 400 B. C. (605 – 200 = 405) for the former and *circa* 1000 B. C (820 + 200 = 1020) for the latter.

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*In addition to these, a few more dates are available for Atranjikhera and Noh but the details are not clear, hence not included here. However, they do not affect our findings (*infra*).

One date, TF. 737, is also available for the P.G. Ware deposits at Tilaurakot, Nepal (Agrawal, 1968b, Table 4).

Hastinapur (Lat. 29°9′ N., Long. 78°3′ E.)

The results of five radiocarbon samples are available for the P.G. Ware deposits at Hastinapur viz TF 83 (Agrawal, 1964a, 40-42), TF. 112 (Agrawal, 1964b, 266-69), TF. 90 (Agrawal, 1964a, 40-42,, TF. 91 (Agrawal, 1964b, 266-69), and TF. 85 (Agrawal, 1964a, 40-42). The first two samples are derived from layer 26, the material of pit (Pit Y SB layer 25) is also mixed in them. The next, TF. 90, is also from layer 26, it has no admixture.

These three samples belong to the uppermost level marking the end of P.G. Ware at the site. Archaeologically, this level has been dated to c. 800 B. C. The C^{14} determinations read 335 ± 110 B. C. for TF. 83, 375 ± 100 B. C. for TF. 112, and 385 ± 110 B. C. for TF. 90.

The last two samples, TF. 91 and TF. 85, are from layers 27 and 28 respectively. The sample TF. 85 contains some material also from the pit (Pit Z SB layer 27). These two samples belong to the late level of the P.G. Ware deposits. The C^{14} dates read 570 ± 125 B. C. for TF. 91 and 505 ± 130 B. C. for TF. 85.

TABLE 21

Carbon-14 Dates and Corresponding

Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 83	Layer 26 and Pit Y SB 25, Depth 6.25 m., HST-1/1962	End of P.G. Ware (Uppermost layer, Period II, c .800 B.C.)	335 ± 110
TF. 112	Layer 26 and Pit Y SB 25, Depth 6.8 m., HST-1/1962	,,	375 ± 100

TABLE 21 (Contd.)

TF. 90	Layer 26, Depth 6.6 m., HST-1/196	End of P.G. Ware (Uppermost layer, Period II, c. 800 B.C.)	385±110
TF. 91	Layer 27, Depth 6.9 m., HST-1/1962	Late level, Period II	570±125
TF. 85	Layer 28 and Pit Z SB 27, Depth 7.25 m. to 7.45 m., HST-1/1962	, ,	505±130

The comparison between the archaeological estimates and the corresponding radiocarbon determinations reveals that the former are invariably older than the latter. Obviously, they are not in agreement to each other. But as regards the relationship between the C^{14} dates and their corresponding stratigraphic sequence it may be observed that, barring TF. 85, the rest are generally consistent. TF. 83 and TF. 112, however, have some discrepancy which might have been caused due to the mixing of material from the pit, so is the case with TF. 85 which belongs to layer 28 and Pit Z SB layer 27. The remaining two dates TF. 90 and TF. 91 are although consistent yet need confirmation in view of the fact that even where several sets of dates are available for the same layer ,the level could not securely be dated (*supra*). However, TF. 90 reading 385±110 B. C. or c. 400 B. C. can provisionally date the upper limit as it belongs to the uppermost layer of Period II. For the lower limit we have no C^{14} date. Some idea, however, may be formed by applying the span of the upper two layers 26 and 27 to those of the remaining. Period II is represented by the deposits consisting about six layers, 26-31. The C^{14} based span of layers 26 and 27 comes to 185 years. If we project the same scale, 370 years may be attributed to the remaining four layers (28 to 31). On this computation the total span of the entire deposits would measure 555 years (370 + 185 = 555). By adding the total span to the upper limit (400 + 555 = 955), the lower end may provisionally be fixed somewhere around the 1st millennium B. C.

Alamgirpur (Lat. 30° 45′ N., Long. 75° 50′ E.,

There is only one date TF. 51 (Agrawal, 1964a, 40-42) for the P.G. Ware deposits at the site. It reads A.D. 860 ± 100. Agrawal observes that because such a large contamination is unlikely and also as from the section the sample appears to belong to disturbed strata the possibility of a wrong identification of the levels cannot be ruled out.

Ahichchhatra (Lat. 28° 22′ N., Long. 79° 7′ E.)

For the P.G. Ware deposits we have only one date from Ahichchhatra, TF. 317 (Agrawal, 1966b, 276-78). The sample has been derived from possibly a disturbed layer 15 at a depth of 3.4 m. Archaeologically, it belongs to the late phase ascribable to c. 600 B C. The corresponding C^{14} date reads 270 ± 106 B. C.

The comparison between the C^{14} date and the corresponding archaeological estimate reveals that the former is younger by 330 years than the latter. The single C^{14} date does not agree with the proposed estimate. But while comparing this date (TF. 317) with that (TF. 311, 445 ± 105 B. C.; Agrawal, 1966a, 4-5) for the immediately succeeding layer, Pit 5 SB layer 14, representing the transitional level, we notice a serious disagreement between the two dates themselves.

Atranjikhera (Lat. 27°42′ N., Long. 78°44′ E.)

We have three C^{14} dates for the P.G. Ware deposits TF. 287* (TIFR Date List, 1968a, June), TF. 291

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*TF. 287 is too young to be considered in the P.G. Ware con text, hence omitted hereafter.

(Agrawal, 1966a, 4-5) and TF. 191 (Agrawal, 1964b, 266-69). The samples TF. 291 and TF. 191 have been derived from layer 6 of the *different trenches* at the depths of 2.50 m. and 3.20 m. respectively. The correlated stratigraphy of these samples is not clearly indicated. However, TF. 291 is reported to have belonged to the late level. TF. 191[1] was originally assigned to the earliest level of the P.G. Ware deposits but later on the excavator (Gaur, 1965, 142) modifying the level of derivation assigned it to the mid level. Archaeologically, the P.G. Ware deposits at the site have been dated to c. 1200 to 600 B. .C. The C^{14} determinations of the above samples read AD. 300 ± 100 for TF 287, 535 ± 100 B. C. for TF. 291, and 1025 ± 110 B. C. for TF. 191.

TABLE 22

Carbon-14 Dates and Corresponding

Stratigraphic Sequence [2]

Index	Locus	Arch. Date	C^{14} Date
TF. 291	Layer 6, Depth 2.50 m., ARJ-4, D1 (SE)	Late level, P G. Ware Deposits (c. 600 B. C.)	535±100
TF. 191	Layer 6, Depth 3.20 m., ARJ-4, D1 (SW)	Mid level, P.G. Ware Deposits	1025±110
TF. 289	Layer 4, Depth 0.95 m., ARJ-4, E1 (SW)	Black-and-red Ware Deposits	675±110
TF. 415	Layer 8, Depth 0.5 m., From baulk between trench E1-E2	,,	570±210

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[1] There is some controversy on its level of derivation, however, it is immaterial as this date is not valid (*infra*).

[2] Dates for the black-and-red ware deposits have also been included in order to demonstrate a better picture.

The dates belonging to the P.G. Ware deposits are consistent with the corresponding stratigraphic sequence. It is obvious as the date for the mid level (TF. 191, is older than the late one (TF. 291). But inspite of the local consistency they do not seem to be dependable for the following reasons, first, the difference between the dates for the two consecutive levels reading about 500 years does not reasonably explain the position, it is certainly too high to concede to; secondly, the available C^{14} dates (TF. 289 and TF. 415) for the preceding black-and-red ware deposits are completely inconsistent in relation to the dates for the P.G. Ware deposits. The status which the controversial date, TF. 191 (1025 ± 110 B.C.), occupies in the larger stratigraphic profile is needless to pin point. Objectively speaking, none of these dates including those for the black-and-red ware deposits is dependable.

FINDINGS

Among the five dated sites the dates for only two, Hastinapur and Noh, are to some extent dependable, but they too need confirmation. The dates for the rest three are either contaminated (Alamgirpur and Ahichchhatra) or neutral in value (Atranjikhera).

Hastinapur and Noh provide dates for the late and the mid phases ranging from c. 600 to 400 B. C. and from c. 800 to 600 B. C. respectively. The span of the each phase is the same, measuring about 200 years.

We have no date for the early phase from any of the sites. Some idea about the early phase, however, may be formed on the basis of the available span of the late and the mid phases at the above sites. On application of the same scale to the early phase, roughly 1st millennium B. C. is indicated at both the sites for the lower limit of the P.G. Ware deposits.

Although, the conclusion so drawn, i.e. based on the computation of the extension limit, is not very dependable one yet unless direct dates are available for the phase in question the bracket, as deduced above, ranging from c. 1000 to 400 B. C. seems to be the most reasonable.

Archaeologically, nothing conclusive has come out so far to reduce the antiquity of the P.G. Ware culture to an extent as often pleaded. The overlap of the P.G. with the N.B.P. Ware, as sometime over emphasized, has nothing warranted to curtail its antiquity, so is the association of iron. The iron has already been found in other part of the country in the context of 1st millennium B.C. It is not surprising if it appears in this region also at least in the same date-context, if not earlier. The discovery of an independent horizon of the black-and-red ware deposits along with the black-slipped ware, and the preponderance of these wares over the P.G. Ware at a number of sites have certainly some objective archaeological evidence to date these sites, at least, earlier than Hastinapur which has almost negligible quantity of the Black-and-red and the black-slipped wares. The similarity in types of the P.G., the Black-and-red and the black-slipped wares are also suggestive. Gaur (1965) has already pointed out such similarity at Atranjikhera. Revaluating the problem of the origin and antiquity of the P.G. Ware, Misra (1970, 14) has also drawn our attention to some of the logical queries. Whether it is mere accident that the Black-and-red and the black-slipped wares are common to both, the black-and-red ware and the P.G. Ware cultures? Whether the continuance of pottery types of the black-and-red ware assemblage into that of the P.G. Ware is also accidental? "If one answers the above queries in the negative, one is bound to give some serious thought to the points of similarity."

The recently proposed shorter chronology ranging from c. 800 to 400 B. C., as referred earlier, does not rest on any firm footing. There is, of course, no serious disagreement regarding the upper limit but as regards the lower one, it appears to be less objective as no sound reasoning has been advanced for picking up the date, c. 800 B. C. The frequently repeated observations that the P.G. Ware culture has nothing to account for the longer duration, on the one hand, and the presence of iron in its assemblage, on the other, do not deprive it from deeper antiquity and longer span. There are cultures with still greater span, dated by the C^{14} evidence, which also have in that way little to account for the longer duration but they did prolong. The Banas culture at Ahar continued to survive for about 800 years (*supra* p. 81—84), the Chalcolithic Chirand existed for about the same span (*supra* p. 124), and the Southern Neolithic is known to have lasted for about 1300 years (*supra* p. 46). Besides these, the Iron Age cultures, the Megalithic and the N.B.P. Ware, are also well within the high range of longevity. The longevity, as revealed by the archaeological evidence, is greater in the rural and still greater in the formative cultures. It is evident from the facts that the span of the successive cultures has gradually declined right from the Palaeolithic to the N.B.P. Ware.

The rural Chalcolithic cultures are generally longer in span than that of the urbanised N.B.P. Ware culture, barring only a few which might have been affected by some other forces, probably the disharmony in the relationship between the internal challenge and response. The urbanised culture normally witnesses quick changes than the rural one due to the sharp inner contradiction in the production relations. It is amply clear from the modern analogy as well. The rural India is still bonded with the old social order and economic institutions while the urban one has passed through several changes. Taking the dynamic view of the combined evidence it does not seem reasonable to assign only 400 years to the P.G. Ware culture which has rural shade and, which also broadly, precedes the urbanised N.B.P. Ware having four to six centuries span.

CHAPTER VII

N.B.P. WARE CULTURE

The N.B.P. Ware culture hardly needs any introduction. It is one of the most widely discussed topics of the Indian archaeology. Here we will survey only the dating aspect of this culture in the light of evidence other than carbon-14.

The discovery of a few pieces of the N.B.P. Ware, regarded as a kind of 'Greek Black ware, at Taxila by Marshall was the earliest evidence which later played an important role in determining the archaeological time-bracket of this culture. This evidence was discussed in detailed for the first time by Deva and Wheeler in 1946 (Deva, 1946, 55-59): "....two fragments only were found in the second city (Sirkap), established probably in the first half of thc second century B. C.: one sherd at a depth of 18 feet below surface and therefore presumably of early date, the other sherd in a more doubtful context in a shallower site on the Hathial Ridge. The remaining sherds from Taxila, about eighteen in number, all came from the preceding city on the Bhir Mound. Here it is noteworthy that the larger number came from between 7 feet and 13 feet below the surface, only two fragments being higher than a depth of 7 feet (one at 4 feet 10 inches and one at 6 feet 2 inches). There is good evidence, particularly in the form of two hoards..., that the occupation level at the average depth of 6 feet below the surface is approximately of 300 B. C., prior to which date the majority of the sherds must be placed.

"At Taxila therefore the 'northern black polished ware' is mainly of pre-Greek period and cannot be ascribed, as has been suggested, to Greek influence. In origin it may well go back to the fifth century B.C. and it is unlikely to have survived later than the early part of the second century B C.

"The central points in time and space for the ware are thus (a) fourth century B C., and (b) the Gangetic plain".

While using Taxila evidence Lal (1954-55, 23) observed that "the N.B.P. Ware at Taxila is essentially pre-Alexandrian and, with 7 ft. of occupational deposits between the Alexandrian level and the lowest N.B.P. sherds, the ware may well have appeared at the site sometime during the sixth century B. C." Wheeler (1959, 31), practically, rejects the Taxilian evidence. He says, "since Taxila was not dug stratigraphically in the modern usage of the term, these depths are an unreliable guide." *

The next important evidence, after Taxila, for the dating of the N.B.P. Ware comes from Kausambi (Sharma, 1958; 1960; 1968; 1969). The chronology

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*Sinha (1969,184), on the other hand, after studying Taxila evidence in detail says that "So far Marshall's excavation at Taxila is concerned, it is reliable. He has been unnecessarilly criticised. Irrespective of the method followed by him, his observation and authority cannot be challenged. The dating of Taxila is convincing, it should be included in early group." But while giving details he comments that some portion of Taxila evidence is "an unreliable guide." He observes that" As we do not know the nature of the lowermost deposits from Sirkap, these specimens (Sirkap sherds) are an unreliable guide. They are not said to be associated with any known Greek finds. Furthermore, since we cannot assume with any certainty that the 'Greek' city was raised everywhere on the natural soil, the 'Sirkap' specimens are at best an unsatisfactory guide for the later date limit" (Sinha, 1969, 177). However, on the basis of the stratigraphical position of the remaining 15 specimens from Bhir Mound, he holds, the "N.B.P. at Taxila ought to be dated to 500-300 B. C." (Sinha, 1969, 178).

of the N.B.P. Ware has been discussed in length in the detailed report on the results of the earlier excavation conducted during 1949-50 at the Asokan Pillar area (Sharma, 1969, 15-23) The N.B.P. Ware deposit has been designated as Period IV* at the site. In the Pillar area the average total thickness of this deposit, comprising layers 16 to 8, measures 15 ft. This period contains eight sub-periods of habitation. Of these, the earliest five have been designated as pre-structural sub-periods (PS I-PS V). The subsequent three have been named as SP IA, SP IB, and SP II.

Besides stratigraphic and structural evidence, the dating is very well documented also by the numismatic and the epigraphic evidences. More than six hundred coins, four seals and eleven sealings are reported (Sharma, 1969, 18, 78). Of the coins 366 have come in hoards and the remaining are recovered from layers 11 to 1. Layers 12 to 8 belong to the last three sub-periods (IA, IB, II) of the N.B.P. Ware deposit. We will mention below only those which have direct bearing on the dating of N.B.P. Ware deposit. From sub-period II (the uppermost of N B.P. Ware deposit), equated with layer 9, a large number of tiny uninscribed cast coins have been discovered. Besides, the uninscribed cast coins with elephant on one side and arched hill on the other, and the lanky bull types have also been found. Layer 9 of this period represents evidence of "some extensive and disastrous conflagration" as a result of which, "the industry of the N.B P. Ware received a shock from which it never fully recovered". Layer 8 marks the virtual disappearance of the N.B.P Ware. The coins associated with sub-period III include, in addition to

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*Originally the N.B P. Ware deposit at Kausambi was designated as Period II (Sharma, 1958). Subsequently it was modified to as Period III (Sharma, 1960), it was redesignated as Period IV (Sharma, 1969). We have followed the latest designation in our work,

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those types mentioned above, a coin of Brahaspatimitra II "This coin, on palaeographic and other grounds, has been dated to the later half of the 2nd century B. C." A seal of Dutuka, belonging to c. 2nd century B. C. has been found from a layer intervening between sub-periods II and III. On the basis of these numismatic, palaeographic and the internal evidence of the ware as met with in the Asokan Pillar area, the end of N.B.P. Ware was dated to *circa* 2nd century B. C.

For the lower bracket there is no datable material of this nature. However, from sub-periods IA and IB uninscribed cast coins are reported. "The earliest coin from SP-IA was an uninscribed cast one showing tree in-railing, arched hill and hollow cross on the obverse, and possibly an elephant before the standard on the reverse". From SP IB "the uninscribed cast coin of the so called 'lanky-bull' type occured for the first time in layer 10" at the site. It has been assigned to third century B. C. On these evidences SP-IA has been dated to the middle of fourth century B. C. Now, there are five pre-structural (PS I to PS V) sub-periods below SP-IA which have no datable evidence. The excavator, having considered the general context of the site, has assigned an average duration of fifty years to each pre-structural sub-period. On this basis the beginning of the N.B.P. Ware has tentatively been placed to c. 600 B. C.

The subsequent work at Kausambi (Sharma, 1960, 19-23) suggested some modification in the upper date-limit of the N.B.P. Ware at the site. At the Asokan Pillar area it was dated to 2nd century B. C. but in the light of evidence comprising inscribed coins, seals, terracotta figurines and arrow-heads noted at the Defence-complex the upper date-limit has been modified to the middle of the 1st century B. C. The lower date-limit c. 600 B.C., however, remains the same.

Hastinapur (Lal, 1954-55, 21-23) provides another important evidence for the dating of the N.B.P. Ware. Here, the deposit yielding N.B.P. Ware has been designated as Period III which came to an end as a result of conflagration. The site was abandoned for some time to come. From the lower levels of Period IV, which succeeds the N.B.P. Ware deposit, five coins of the rulers of Mathura including two coins of Seshdatta have been recovered. On this basis the beginning of the Period IV has been dated to c. 200 B. C. The gap between Periods III and IV has been proposed to be of a century in duration. The end of Period III, thus, has been placed somewhere in the first half of the third century B. C. The date for the lower limit of the Period depends mainly on the computation of the duration for the occupational thickness and the sub-periods noted therein. The thickness of the occupational strata is consistently 9 feet or slightly over at Hastinapur-2. Archaeologically, six sub-periods have been distinguished in this deposit. Ascribing fifty years to each, some three centuries have been surmised for the span of Period III. On the basis of the combined evidence the beginning of the N.B.P. Ware has been dated to c. 600 B. C. at the site. The proposed dating at Hastinapur has also been supported by the evidence of Taxila and Kausambi.

The early dating for the N.B.P. Ware as proposed at Hastinapur and Kausambi has been disputed by some who, instead, prefer a late date. Gordan (1954-55, 175) asserted that the available evidence "does not admit of the N.B.P. Ware being dated back earlier than 400 B. C. at the very earliest. A central date for this ware is not the fourth century B. C. but the second century B. C." He adhered to this view in his later publications as well (Gordan, 1957; 1958). Wheeler (1959, 30-31), on the other hand, thinks that the "N.B.P. may be ascribed to 5th-2nd centuries B.C."

Despite some disagreements, the roughly half a millennium-long span, as estimated on well documented archaeological ground at the above two pioneer sites, continued to serve as an index for the general dating of the N.B.P. Ware in the formative stage of work on the problem. In the recent past, following Kausambi and Hastinapur, a large number of the N.B.P. Ware yielding sites have been excavated and explored which have considerably expanded the area of its distribution. The expansion in area gave rise to some new problems of which the question of the relationship of different zones in respect to the relative frequencies of the N.B.P. Ware together with its bearing on the dating in the corresponding zones, has led to make distinction between the dating for the central and the peripheral area of the N.B.P. Ware culture. Wheeler (1959, 31) in view of the evidence noted at Charsada near Peshawar and Udegram in Swat, has ascribed the N.B.P. Ware of the north-westerly regions of the sub-continent to the period 320-150 B. C. and somewhat earlier beginning in the Ganga basin. Thapar (1964-65, 74) also observes that "its extension in the peripheral areas in western, eastern and southern India may perhaps coincide with the expansion of the organized Mauryan Empire….. " Agrawal (1968a, 6) has well emphasized the question of the mode of spread of the N.B.P. Ware inorder to understand its relative antiquity in the various pockets. He has indicated to distinguish the two modes of spread, diffusion and trade ; the sites in contacts by trade would be coeval with the epicentres, but diffusion will be a slow process. He has pointed out that Ujjain,* Besnagar, Taxila, etc. may have got the N.B.P. by trade, but at Hastinapur it might have reached through diffusion. In that case "the N.B.P. at the latter site could be a couple of centuries later (viz. ca. 400 B. C.) than its primary centres."

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*The quantum of N.B.P. Ware at Ujjain hardly indicates trade contact.

Recently Sinha (1967; 1969, 174-184) has proposed a new hypothesis for the chronology of the N.B.P. Ware in the light of Sravasti evidence. He has attempted to study the 'context' and to establish a comparative stratigraphy of the total assemblage as against just that of the deluxe ware alone. The main conclusions drawn by him are as below :

that "the N.B.P. Ware is found to occur in at least two widely differing contexts—one earlier and the other decidedly later. The earlier is represented at the sites like Taxila, Vaisali, Sravasti, Rajghat, Rajgir and Kausambi; and the later at Hastinapur, Rupar, Ujjain, Navdatoli, Charsada etc. Gordan is, therefore, not justified in applying a uniformly late dating for all N.B.P."

that "the sites like Kausambi, Rajgir Vaisali and Sravasti may be regarded as those included under primary distribution list and here its main duration was between 500-300 B.C. with the likelihood that the ware continued later but with a considerably decreased popularity. Taxila may also be included in this list where, perhaps, the ware was imported from eastern centres".

that "the sites under secondary distribution would include Hastinapur, Rupar, Ujjain, Kumrahar, where the associated assemblage does not point to a date earlier than 350 B. C."

that "the spread of N.B.P. does not appear to have been connected in anyway whatsoever with the extension of Mauryan domination......Not only does the main chronological horizon of the N.B.P Ware on sites under primary distribution appear to have antedated the spread of Mauryan Empire, the site of Kumrahar identified with the Mauryan capital Patliputra, produced N.B.P. Ware wholly insignificant in number and quality while the neighbouring Rajgir, the supposed Magadhan metropolis during pre-Mauryan times was an important N.B.P. producing centre".

In the following section we will examine the radiocarbon dates.

C^{14} DATES SCRUTINIZED

For the N.B.P. Ware deposits we have C^{14} dates from about twelve sites viz Hastinapur, Ahichchhatra Atranjikhera, Kausambi, Rajghat, Hetimpur, Chirand, Rajgir, Besnagar, Ujjain, Kayatha and Rupar. The first eight sites belong to the Ganga valley and the last four to the peripheral regions. There are about 29 dates representing the various levels of the deposits. The details of our study are as below.

Hastinapur (Lat. 29°9′ N., Long. 78°3′ E.)

Three C^{14} dates are available for the N.B.P. Ware deposit (Period III) at Hastinapur—TF. 81 (Agrawal, 1964b, 266-69), TF. 80 + 82 and TF. 88 (Agrawal, 1964a, 40-42). The first sample has been derived from Trench HST-1/1962, layer 18 at a depth of 5.1 m. and belongs to the uppermost layer of th Period, marking the end of N.B.P. Ware at the site. The second one, TF. 80 + 82, represents a composite of two samples derived from identical layers and depths (layer 23 & depth 3.9 m.) of the northern extension of Trench HST-1/1962. It is reported to have belonged to the end of Period III. The archaeological date for the end of Period III has been proposed to c. 300 B. C. The C^{14} dates read 125 ± 110 B. C. for TF. 81 and 50 ± 110 B.C. for TF. 80 + 82. The last sample TF. 88 has been collected from the lowest layer, 25, of the Period at a depth of 6.45 m. It marks the beginning of N.B.P. Ware at the site. Archaeologically, it has been dated to c. 600 B. C. The corresponding radiocarbon determination reads 340 ± 110 B.C.

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TABLE 23

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C14 Date
TF. 81	Layer 18, Depth 5.1 m , Trench HST-1/1962	Period III, Uppermost Layer, (c. 300 B. C.)	125±100
TF. 80 + 82	Layer 23, Depth 3.9 m., Trench HST-1/1962 (North Extn.)	End of Period III, (c. 300 B. C.)	50±110
TF. 88	Layer 25, Depth 6.45 m., Trench HST-1/1962	Period III, Lowest Layer, (c. 600 B. C.)	340±110

The comparison between the C^{14} dates and the corresponding archaeological estimates, no doubt, reveals that the former are invariably younger than the latter, but it may be noted that the available two dates for the end of Period III are themselves not in agreement to each other. Considering the nature of the Period, the difference between the two measuring about 75 years cannot be ignored, as the duration of this extent matters in the Early Historical period. Besides, the above two dates do not seem to be consistent with the corresponding stratigraphic sequence as well. In view of these, it is pretty difficult to emphasize any date as dependable for the end of Period III at the site.

The date, TF. 88, for the early level of the Period may provisionally be considered as valid in the context of those dates, especially TF. 90, available for the end of P.G. Ware deposit at the site But it too needs confirmation as the dates for the end-phase of the P.G. Ware themselves are not securely dated (*supra*). However, the beginning of N.B.P. Ware may tentatively be ascribed to c. 400 B. C. or a little later.

Ahichchhatra (Lat 28° 22′ N., Long. 79° 7′ E.)

For the N.B P. Ware deposit (Period III) at the site we have two dates—TF. 310 and 311 (Agrawal, 1966a, 4-5) reading 160±95 B. C. and 475±105 B. C. respectively. The samples have been derived from Pit 4 SB layer 8A and Pit 5 SB layer 14 at the depths of 2.5 m. and 3.8 m. respectively. TF. 311 belongs to the overlapping stratum of the P.G. and the N.B.P. Wares, consequently it will date the beginning of N.B.P. Ware at the site. About TF. 310, the phase is not reported. In order to evaluate the relative position of these dates in respect to those for the preceding and the succeeding deposits the, available, following two dates may also be considered—TF. 301 and TF. 317 (Agrawal, 1966b, 276-78). TF. 301, 370±105 B. C., belongs to Phase II of the Early Historic Defences (Period IV), and TF. 317, 270±105 B. C., to the late phase of the P.G. Ware deposit (Period II) at the site.

TABLE 24

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 301	Layer 1, Depth 0.8 m., Trench (?)	Period IV, Phase II of Early Historic Defences	370±105
TF. 310	Pit 4 SB Layer 8A, Depth 2.5 m., High Mound	Period III, N.B.P. Ware Deposits	160±95
TF. 311	Pit 5 SB Layer 14, Depth 3.8 m., High Mound	Period III, N.B.P. Ware Deposits, also yield P.G. Ware	475±105
TF. 317	Layer 15, Depth 4.4 m.	Period II, Late Phase, P.G. Ware Deposits.	270±105

The dates, TF. 310 and TF. 311, for the N.B.P. Ware deposit are obviously consistent with the corresponding stratigraphic sequence as the date for the lower layer is older than that of the upper one. The difference of 300 years (475 – 160 = 315) between the two is also not unreasonable for the intervening deposit which comprises about five layers. But, while evaluating them in larger stratigraphic profile the discrepancy arises. Neither of the dates, TF. 317 and TF. 301, available for the preceding and the succeeding deposits of the N.B.P. Ware is consistent. It is evident from the behaviour of dates as revealed by their plotting (Table 24) in respect to the stratigraphic sequence. TF. 301 (370 ± 105 B. C.) belonging to Phase II of the Early Historic Defences is certainly too old to explain the Period to which Phase II has been assigned to on the archaeological ground. TF. 317 (270 ± 105 B. C.) representing the P.G. Ware level is also not in keeping with the archaeological context. It appears that the sample which was collected from the make up of the Defences might have been transported from some earlier horizon, it is not unlikely especially in the case of Defences. For TF. 317, the possibility of contamination may not be ruled out as the sample was collected from a disturbed stratum. In view of these, the validity of dates, for the N.B.P. Ware levels which have at least local consistency, cannot completely be ignored. On this consideration the beginning of N.B.P. Ware may provisionally be assigned to the second quarter of the fifth century B. C. at the site. For the end, it is difficult to pin point in the absence of the necessary data. However, it appears that the ware continued to exist at least upto the middle of the second century B. C.

Atranjikhera (Lat. 27° 42′ N., Long. 78° 44′ E.)

From Atranjikhera four dates are available for the N.B.P. Ware deposits (Period IV), namely, TF. 195, (TIFR Date List, 1966c, Oct.), TF. 194, TF. 283 and

TF. 284 (Agrawal, 1966a, 4-5). They correspond to layers 14, 16, 27 and 29 respectively. It is significant that all of them belong to regular layers, none of them is from pit, hence the chances of contamination are very less. The C^{14} determinations read A. D. 50 ± 100 for TF. 195, 530 ± 85 B. C. for TF. 194, 260 ± 105 B.C. for TF. 283, and 295 ± 100 B. C. for TF. 284.

TABLE 25

Carbon-14 Dates and Corresponding

Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 195	Layer 14, Depth 2.15 m., Trench ARJ-4	N.B.P. Ware Deposit	AD. 50±100
TF. 194	Layer 16, Depth 3.1 m., Trench ARJ-4	,,	530±85
TF. 283	Layer 27, Depth 4.85 m., Trench ARJ-4	,,	260±105
TF. 284	Layer 29, Depth 5 m , Trench ARJ-4	,,	295±100

The available information regarding the archaeological dates for the corresponding C^{14} samples is too vague to assess the relationship between the two, it is not possible just on the round term that has been reported to, i.e. N.B.P. Ware deposits. The position of consistency of the C^{14} dates in relation to the corresponding stratigraphic sequence, however, may be evaluated. Barring TF. 194, the rest three are no doubt consistent, but, the difference of about 35 years between the last two dates, TF. 283 and TF. 284 belonging to layers 27 and 29 respectively, does not reasonably explain the life of the three layers, ie 27 to 29. If the stratification is not arbitrary the possibility of the samples being sub-representative cannot be ruled out. However, the existence of the N.B.P. Ware at the site from c. 300 B.C. to A.D. 50 is well indicated. But it is difficult to pin point the initial and the terminal limits for the ware on the basis of the published data.

Kausambi (Lat. 25° 20′ N., Long 81° 23′ E.)

Eight C^{14} dates are available for the N.B.P. Ware deposit at the site—TF. 100 (Agrawal, 1964b, 266-69), TF. 103, TF. 105, TF. 104 (Agrawal, 1965a, 42-43), TF. 225, TF. 226, TF. 219 and TF. 221 (Agrawal, 1965c, 394). The first six dates belong to the Ghositarama monastery area, and the last two to the Asokan Pillar area.

The samples TF. 100 and TF. 103 have been derived respectively from Pit A and Pit C, both sealed by layer 18A BK. They belong to the mid level of the Late Phase of N.B.P. Ware deposit. The corresponding C^{14} dates read 275±100 B. C. and 410±110 B. C. The next two samples, TF. 105 and TF. 104, have been collected from Pit A SB layer 21 BK, and layer 22 BK respectively, they correspond to the late level of the Mid Phase, the dates read 335±115 B. C. and 270±110 B. C. TF. 225* and TF. 226 belong, respectively, to layers 11 and 12 representing the upper level of the pre-repair phase of Rampart II at the Ghositarama monastery area. This level has been attributed to the mid level of the Mid Phase of the N.B.P. Ware deposit. The C^{14} dates read 400±110 B. C. for TF. 225 and 220±100 B. C. for TF. 226. The last two samples, TF. 219 and TF. 221, have been picked up from Road I, and Pit B SB layer 12 respectively. The latter, TF. 221, corresponds to PS V at the site (Sharma, 1969, xxii). Stratigraphically, the last two samples belong to the mid and the early levels, respectively, of the Mid Phase of N.B.P. Ware deposit. On archaeological ground they have been dated to c. 350-275 B. C. and c. 400-350 B. C. (Sharma, 1969, xxii). The C^{14} determinations read 440 ± 100 B. C. and 500 ± 105 B.C. respectively.

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*TF. 225 has been reported by Agrawal (1965 c, 394) to have belonged to the early level of the N.B.P. Ware deposit, perhaps, due to some confusion.

TABLE 26

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date*	C^{14} Date
TF. 100	Pit A sealed by Layer 18 A BK, Depth 2.15 m. Locus 1-2, KSB-G/R-YZ2	Mid level of the Late Phase, N.B.P. Ware Deposits.	275 ± 100
TF. 103	Pit C sealed by Layer 18A BK, Depth 3 m. BS, Locus 2-3, KSB-G/R-YZ2	,,	410 ± 110
TF. 105	Pit A sealed by Layer 21 BK, Depth 2.4 m. BS. Locus 1-2, KSB-G/R-YZ2	Late level of the Mid Phase, N.B.P. Ware Deposits.	335 ± 115
TF. 104	Layer 22 BK, Depth 2.4 m. BS, Locus 2-3, KSB-G/R-YZ2	Late level of the Mid Phase, N.B.P. Ware Deposits (c. 275 B. C.)	270 ± 110

*All the archaeological estimates for the corresponding samples were supplied to the laboratory along with the samples.

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TABLE 26 (Contd.)

TF. 225	Layer 11, Depth 1.6 m., Locus 1-2, KSB-G/R-YZ3	Mid level of the Mid Phase, N.B.P. Ware Deposits (c. 325 B. C.)	400±110
TF. 226	Layer 12, Depth 0.3 m., Locus 1-2, KSB-G/R-YZ3	Mid level of the Mid Phase, N.B.P. Ware Deposits (c. 325 B. C.)	220±100
TF. 219	Road I, Depth 3 m., Locus 2-7, KSB I-III-RD	Mid level of the Mid Phase, N.B.P. Ware Deposits (c. 350-275 B. C.)	440±100
TF. 221	Pit B sealed by Layer 12, Depth 4.3 m., Locus 5-7, KSB I-III-RD	Early level of the Mid Phase, N.B.P. Ware Deposits (c. 400-350 B. C.)	500±105

The measurements of the first three samples, TF. 100, TF. 103 and TF. 105, derived from different pits are obviously not consistent. The inconsistency might have been due to the chance-mixing of earlier material which is not unlikely as all these pits on the respective sections have been found to have disturbed the earlier layers. The above possibility has also been indicated by the measurements of the samples themselves, they invariably have provided older dates than those expected.

The remaining five dates for the Mid Phase, barring one TF. 226, are fairly consistent with the corresponding archaeological sequence. It is evident from the fact that the date for the early level of the Mid Phase, TF. 221 (500±105 B. C.), is older than that for the mid level of the same phase, TF. 219 (440±100 B. C.). Again, the two dates for the mid level, TF. 219 (440±100 B. C.) and TF. 225 (400±110 B. C.), are consistently older than that for the late level of the Mid Phase, TF. 104 (270 ± 110 B C.).

As regards the relationship between the proposed and the radiocarbon dates, it appears that the former are based on conservative estimate as the suggested archaeological dates are consistently younger than the corresponding C^{14} determinations.

TABLE 27

Showing Relationship between Archaeological Estimates and Valid C^{14} Dates

Index	Horizon	Proposed Date	C^{14} Date
TF. 104	Late level, Mid Phase of N.B.P. Ware Deposit	c. 275-190 B C.	270 ± 110
TF. 225	Mid level, Mid Phase of N.B.P. Ware Deposit	c. 325 B.C.	400 ± 110
TF. 219	Mid level, Mid Phase of N.B.P. Ware Deposit	c. 350-275 B.C.	440 ± 100
TF 221	Early level, Mid Phase of N.B.P. Ware Deposit	c. 400-350 B.C.	500 ± 105

Among the four valid C^{14} dates TF. 225 and TF. 219, archaeologically, belong to the same age group (mid level of the Mid Phase) and their empirical values are also almost the same. The mean of the two reads 422 ± 74 or c. 425 B. C.

While determining the time-bracket for the deposit in question it may be stated at the outset that we have no C^{14} date for the Early Phase at the site. The dates available for the Late Phase are, unfortunately, not valid. For the Mid Phase we have four consistent dates, the two (TF. 225 and TF. 219) belong to the mid level and one each to the late (TF. 104) and the early levels (TF. 221). The date for the early level is older by 78 years* than that for the mid one. The difference between the two is 'real' with maximum level of confidence as by adding two standard deviations on the younger and one on the older date, the younger still remains younger. Similarly, the difference between the dates for the mid and the late levels is also 'real'. In view of all these, the dates for the lower and the upper levels of the Mid Phase can safely be depended upon which read 500±105 B.C. and 270±110 B. C. respectively. The span of the Mid Phase of the N.B.P Ware deposit at the site measures 230 years.

On the basis of the above four consistent dates a provisional lower limit for the Early Phase may be extrapolated. The date for the lower level of the Mid Phase reads 500±105 B. C. and the span of the same Phase measures about 230 years. We have four pre-structural periods (PS I to PS IV), at the Asokan Pillar area associated with the N.B.P. Ware, below the level PS V which has been dated to 500±105 B. C. (Sharma, 1969, xxii, 23). Now, if we postulate only 150 years on very conservative estimate for the four pre-structural periods, and not 230 as indicated by the C^{14} evidence for the span of the Mid Phase, the lower limit of the Early Phase would read *circa* 650 B.C. However, the possibility of its being still earlier cannot be ruled out.

Rajghat (Lat. 25° 18′ N., Long. 83° 1′ E.)

We have only one date for the N.B.P. Ware deposit at the site, TF. 293 (Agrawal, 1966a, 4-5). The sample has been derived from layer 11 at a depth of

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*Calculated on the mean of TF. 119 and TF. 225 which reads 422±75 B. C.

9.45 m. Archaeologically, it belongs to the Early Phase of the deposit. The C^{14} date reads 490±110 B.C. which is younger by 110 years than the proposed date (c. 600 B.C.)

The date TF. 292 (Agrawal, 1966a, 4-5) which belongs to the black-slipped ware deposit, preceding the N.B.P. Ware, may also be considered here in order to check the validity of TF. 293. It reads 470±100 B. C.

TABLE 28

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 293	Layer 11, Depth 9.45 m., RGT-XI	Early Phase, N B.P. Ware Deposit	490±110
TF. 292	Layer 6, Depth 5.9 m., RGT-Cuttings	Black-slipped Ware Deposit	470±100

The date for the earlier deposit is younger than that for the later one. The difference between the two is, however, negligible. Thus, they may be considered as valid provided the date for the black-slipped ware deposit belongs to the uppermost level. If it is so, the mean of the two which reads 470±74 B.C. may represent the initial date for the N.B.P. Ware as well as the terminal one for the black-slipped ware deposit at the site.

Hetimpur (Lat. 25° 3′ N., Long. 83° 11′ E.)

From Hetimpur two dates are available for the N.B.P. Ware deposit—TF. 176 and TF. 177 (Agrawal, 1965a, 42-43 . The samples have been collected from layer 4, and Pit B SB layer 4 respectively. Both of

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them belong to one and the same trench HPR-1/A2. The C^{14} dates read 105 ± 105 B.C. for TF. 176 and A.D. 80 ± 105 for TF. 177.

TABLE 29
Carbon-14 Dates and Corresponding
Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 176	Layer 4, Depth 0.46 m., HPR-1, A2	N.B.P. Ware Deposit	105±105
TF. 177	Pit B SB Layer 4, Depth 1.2 m., HPR-1, A2	,,	A.D. 80±105

The C^{14} dates are not consistent with the corresponding stratigraphic sequence as the date for the lower level is younger than that for the higher one. The difference between the two dates is also 'real'. Under the circumstances it is risky to depend upon either of the two.

Chirand (Lat. 25° 45′ N., Long. 84° 45′ E.)

We have only one date for the N.B.P. Ware deposit, TF. 446 (Agrawal, 1969b, 259-260). The sample has been derived from layer 6 at a depth of 3.25 m. It corresponds to the top of the deposit in question. Archaeologically, the end of N.B.P. Ware at the site has been dated to c. 100 B.C. The available C^{14} date reads 35 ± 105 B.C.

The obtained C^{14} date is younger by 65 years than the suggested archaeological estimate. The end of N.B.P. Ware culture, no doubt, is indicated to somewhere around the middle of the first century B.C. but it is difficult to depend upon a single date alone, as its validity cannot be checked. The other available dates for the preceding culture are not helpful, here, to check the validity.

Rajgir Lat. 25° N., Long. 85° 25′ E.)

Two dates are available for the N.B.P. Ware deposite—TF. 45 and TF. 46 (Kusumgar, 1963, 151). The samples have been derived from layer 4, and Pit 3 cut into layer 5 filled with ashy material of layer 4 respectively. On archaeological ground they have been dated to c. 600 B.C. The radiocarbon determinations read 265 ± 105 B.C. for TF. 45 and 260 ± 100 B.C. for TF. 46.

TABLE 30

Carbon-14 Dates and Corresponding

Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 45	Layer 4, below the mud rampart, Depth 7.05 m.	Pre-Defence, N.B.P. Ware Deposit (c. 600 B. C.)	265 ± 105
TF. 46	Pit 3 cut into Layer 5, below rampart, Depth 8.7 m.	Pre-Defence, N.B.P. Ware Deposit (c. 600 B. C.)	260 ± 100

The comparison between the archaeological and C^{14} dates reveals that, in both the cases, the former are older than the latter. But while comparing the latter with the corresponding stratigraphic sequence it has been found that they are almost consistent. Both the dates are also of the same value which is quite reasonable as they belong to practically the same levels. On the basis of these dates the earliest level of the N.B.P. Ware deposit can be dated to *circa* third century B.C. at the site.

Besnagar (Lat. 23° 32′ N., Long. 77° 48′ E.)

The site belongs to the Central India. Here, the N.B.P. Ware occurs in Period III. We have two dates for the

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Period, TF. 254 (Agrawal, 1965c, 395) and TF. 387 (Agrawal, 1966b, 276-78) The samples of both the dates have been derived from layer 8, but, of the different trenches. The relative position of these layers is not reported. Archaeologically, TF. 254 is said to have belonged to the early phase of the Period. But, for TF. 387 the phase is not mentioned. The C^{14} dates read 295 ± 110 B.C. and 470 ± 105 B.C. repectively.

TABLE 31

Carbon-14 Dates and Corresponding

Stratigraphic Sequence ?)

Index	Locus	Arch. Date	C^{14} Date
TF. 387	Layer 8, Depth 3.5 m., BSN-4	N.B P. Ware Deposit	470 ± 105
TF. 254	Layer 8, Depth 2.70 m., BSN-1	Early Phase, N.B.P. Ware Deposit	295 ± 110

There is a difference of 175 years between the two dates. Their relative stratigraphy, as said above, is not reported. Under the circumstances it is difficult to assess tne relationship between C^{14} dates and the corresponding stratigraphic sequence. If both of them belong to the early phase and identical layers, a large discrepancy between the two is obvious.

Ujjain (Lat. 23° 11′ N., Long. 75° 46′ E.)

This site also belongs to the Central India. The N.B.P. Ware deposit at the site has been designated as Period II. Only one date is available for the Period, TF. 409 (Agrawal, 1969b, 259-60). The sample has been derived from layer 28 at a depth of 5.5 m. The phase to which the sample belongs to is not reported. The C^{14} date reads 450 ± 95 B.C. It is not possible to examine its validity as there is only one date for the deposit in question.

Kayatha (Lat. 23° 30′ N., Long. 76° E.)

It is another Central Indian site which provides C^{14} date for the N.B.P. Ware associated deposit. We have only one date for this deposit, TF. 674 (TIFR Date List, 1967a, July). The sample has been derived from layer 11 which has yielded N.B.P. along with the P.G. Ware. On the basis of the associated material it may be attributed to the early or rather the earliest level of the N.B.P. Ware. The C^{14} date reads 470 ± 100 B.C. Its validity cannot be judged as there is only one date for the deposit.

Rupar (Lat. 30° 58′ N., Long. 76° 32′ E.)

This site belongs to the north-western periphery of the N.B.P. Ware culture. Two dates are available for Period III—TF. 213 (Agrawal, 1966a, 4-5) and TF. 209 (Agrawal, 1965c, 394). The samples have been derived from layers 26 and 30 respectively. TF. 209 belongs to the early level and, archaeologically, it has been dated to c 500-400 B.C. The level of TF. 213 is not reported. The C^{14} dates read 390 ± 105 B.C. for TF. 213 and 485 ± 100 B.C. for TF 209.

TABLE 32

Carbon-14 Dates and Corresponding Stratigraphic Sequence

Index	Locus	Arch. Date	C^{14} Date
TF. 213	Layer 26, Depth (?) RPR-1	N.B.P. Ware Deposit	390 ± 105
TF. 209	Layer 30, Depth 11.4 m., RPR-2	Early Level, N.B.P. Ware Deposit (c. 500-400 B C.)	485 ± 100

The comparison between the C^{14} date and the corresponding archaeological estimate for TF. 209

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reveals that they are fully in agreement to each other. Such comparison is not possible with TF. 213 as its specific archaeological date is not available. As regards the relationship between C^{14} dates and the corresponding stratigraphic sequence, both the dates can be considered as consistent provided the layers are correlated.

On the basis of TF. 209 the beginning of N.B.P. Ware at the site is indicated to c. 500 B.C.

FINDINGS

We have examined twenty nine dates, so far available, for the various levels of the N.B.P. Ware deposits at different sites. It may be stated at the out set that the published archaeological data for the corresponding dated samples are not adequate. It is really a task to work out the sequence of the latter from the data at our disposal, especially for those samples which belong to different trenches as nothing is indicated about their correlation. So is the case with the reported archaeological estimate for the dated samples; mostly we are provided with only a round term, e.g. N.B.P. Ware deposit, without indicating the phases etc. It is too general for evaluating the relationship of the C^{14} date with the expected archaeological estimate.

However, the comparison between the two C^{14} dates and the archaeological estimates, wherever availale, reveals that the former are invariably younger than the latter, excepting Kausambi with which the position is just reverse. Here, the valid C^{14} dates are consistently older than those proposed. As regards the relationship of the C^{14} dates to the corresponding stratigraphic sequence at the respective sites, it has been found that none other than Kausambi has ideally consistent dates. The dates for Rupar, Hastinapur, Ahichchhatra, Atranjikhera,[1] Rajghat and Rajgir can also be considered as consistent but within certain provisos (*supra*). The dates for Chirand, Ujjain and Kayatha, being represented by a single date for each, have been regarded as of neutral value The dates for the remaining two sites, Hetimpur and Besnagar, are perhaps not valid.

TABL 33

Site-wise Time-limits Based on

Valid C^{14} Dates

Site	Date	Remark
Hastinapur	c. 400 B.C.	Lower limit, Early Phase
Ahichchhatra	c. 475 B.C.	Lower limit, Early Phase
Kausambi[2]	c. 500 B.C.	Lower limit, Mid Phase
,,	c. 650 B.C.	Lower limit, Early Phase
Rajghat	c. 500 B.C.	Lower limit, Early Phase
Rajgir	c. 300 B.C.	Lower limit, Early Phase
Rupar	c 500 B.C.	Lower limit, Early Phase

It is clear from the dates in the table that we have no valid date for the Late Phase. For the Mid Phase we have date only from Kausambi. For the Early Phase the dependable dates are from Hastinapur, Ahichchhatra, Kausambi, Rajghat, Rajgir and Rupar. They provide dates for the lower limit of the N.B P. Ware deposits at the respective sites. In the light of these dates the lower bracket can safely be dated to c. 7th-6th century B.C in the central, c. 5th-4th century B.C in the upper and c. 3rd century B.C. in the eastern part of the central Ganga valley. For the upper bracket the available dates are not dependable. However, the forthcoming indication ranges from the 1st century B.C. to the middle of the 1st century A,D. with an emphasis on the former.

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[1] The date of Atranjikhera has not been in cluded in Table 33 as the information regarding its phase is not reported.

[2] Date for the Early Phase has been calculated by adding 150 years to the C^{14} date available for the lower limit of the Mid Phase which reads 500±105 B C. The Early Phase is represented by the four pre-structural sub-periods at the Asokan Pillar area.

A comparison of the initial dates for the N.B.P. Ware at the sites of various regions reveals that it did not appear at all the sites on a single time-plane as the dates vary from each other. But the question immediately arises that what do these regional variations indicate. Do they form any pattern? The available data are of course not sufficient, however, some attempt may be made to understand the possible relationship of these dates with the corresponding regions. The plotting of the dates in the geographical order indicates that they are certainly not hap-hazard. It suggests, at least, some pattern as is clear from the facts that, of the dependable C^{14} dates, the oldest belongs to the central Ganga valley and the others tend to become younger in the either directions, the western and the eastern. The oldest date (c. 650 B.C) for the Early Phase, on extrapolation, belongs to Kausambi; the next in descending order for the same phase comes from Rajghat (c. 500 B.C.), both belong to the central Ganga valley. Proceeding towards the upper region the lower limits at Ahichchhatra and Hastinapur read c. 475 B.C. and c. 400 B.C. respectively. Again, at Rajgir the easternmost dated site the lower limit becomes younger than those at Kausambi and Rajghat.

The date from Rupar reading c. 500 B.C., certainly presents some difficulty.*

From the emerging pattern two things are, however, well indicated, first, that the N.B P. Ware diffuses in the either directions, western and the eastern, from the central Ganga valley and, secondly, that the Ware, besides the regional variations in respect to time, varies also between the two neighbouring sites of the same region. The date for the N.B.P Ware at Hastinapur differs from that at Ahichchhatra, and so the date for the ware in question at Kausambi do not correspond to that of its neighbouring site Rajghat. Besides, the forthcoming pattern also suggests that the central Ganga valley, precisely the eastern Uttar Pradesh, was probably the mother region of this industry. In view of this the observation made by Sharma (1969,xvi -xvii), based on his recent studies in the Vindhyas, regarding the possibility of the common origin of the N.B.P. Ware and the contemporary grey and red wares assemblage from the preceding pottery assemblage of the Vindhyas and the central Ganga valley, is highly significant.

Regarding the temporal relationship between the N.B.P. and the P.G. Wares, our findings are fully in conformity to the recent archaeological evidence as noted at a number of sites. It is almost certain, now, that the former originated sometime during the mid life of the P.G. Ware. Agrawal (1968, 5ff.) has rightly pointed out that the former did not succeed the latter everywhere as was formerly thought to be.

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*A similar difficulty would also arise by the dates from Ujjain (c. 500 B C.) and Kayatha (c. 500 B.C.) if the extant determinations for these sites are confirmed by more dates. The suggestion that the early dating of these peripheral sites indicates trade contact seems plausible, but, only for those which have yielded the N.B.P. Ware in restricted quantity. It may be true to Kayatha but not to Ujjain, For Rupar the quantitative detail of the ware is not available.

The early dating of the N.B.P. Ware has made it difficult to agree with the thesis that the ware spread through the medium of the Mauryan expansion The suggestion that the Nandas were possibly the authors of this ware is also hardly judicious. Who were then the authors ? Can it be associated with the Mahajanapadas ? So far the six Mahajanapadas have provided C^{14} dates for the N.B.P. Ware – Kuru (Hastinapur ?), North Panchala (Ahichchhatra), Vatsa (Kausambi), Kashi (Rajghat), Magadha (Rajgir), and North Avanti (Ujjain). The initial dates for the N.B.P. Ware at the above city-sites vary from each other and range from *circa* 7th-6th century B.C. to *circa* 3rd century B.C. Saving Kausambi, the capital of Vatsa, no other C^{14} dates ideally coincide with the initial date of the Mahajanapadas as indicated by the literary evidence. From the C^{14} evidence at our disposal it appears that the N.B.P. Ware probably diffused from Kausambi and its area of influence to other centres of Mahajanapadas at different time-plane. However, barring a few, the rest of the dates are well within the central range of the Mahajanapadas.

CHAPTER VIII

THE CONSOLIDATED LIST OF C^{14} DATES

In order to provide a consolidated information of the C^{14} dates so far available with specific 'period-level' for the cultures extending from the Neolithic to the N.B.P. Ware, a comprehensive list is being presented here. It includes dates for the Neolithic, the pre-Harappa and Harappa, the other Chalcolithic, the Megalithic, the P.G. Ware and the N.B.P. Ware cultures. Besides India, some relevant dates belonging to the sites in Nepal, Pakistan and Afghanistar have also been incorporated.

The list is framed 'culture-wise; within each 'culture group' the dates are given mostly in relation to the stratigraphic sequence (from top to bottom) at the site.

Each date is furnished with the following informations—site, index number, locus etc., archaeological date, C^{14} date in B.C./A.D., and the reference. The references contain the surnames of the authors, years of publications and the quoted page number. Where the publication is joint, only the first author has been referred to.

As in the text, the dates included in the list are also based on the C^{14} half-life value of 5730 ± 40 years. The scale, A.D. 1950, has been used as the reference year.

NEOLITHIC CULTURES

(Northern Neolithic)

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
BURZAHOM	TF. 10	Trench-BZH 1, IIIx-VIIx, Stratum 6, Depth-1.55 m.	Neolithic (Mud phase)	705±105	Agrawal, 1965 d, 5; Kusumgar, 1963, 146
,,	TF. 129	Trench-BZH-1, XIX-XXII, Stratum 13, Depth 2. 9 m.	Neolithic	1825±100	Agrawal, 1966a, 4 5
,,	TF. 127	Trench-BZH-1, North Extension, XIXx-XXIIx, Stratum-1, Depth-2.92 m.	Neolithic	2100±115	Agrawal, 1965a, 42-43

N. B. All dates are in years B. C. unless mentioned otherwise. Dates marked with an asterisk have been collected from the secondary sources.

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
BURZAHOM	TF. 128	Trench BZH-1, North Extension, XXIIx-XXIIIx, Stratum 13, Depth-3.9 m.	Neolithic	2375±120	Agrawal, 1965a, 42-43
,,	TF. 15	Trench-BZH-3, C2 (SW), Pit A, Depth-1.85 m.	Neolithic	1535±110	Agrawal, 1965 d, 5; Kusumgar, 1963, 146
,,	TF. 13	Trench-BZH-3, A2 (NW), Pit 12, Depth-1.93 m.	Neolithic	1850±125	,,
,,	TF. 123	Trench-BZH-3, B2 (NE) Pit C, Depth 2.82-3.43 m.	Neolithic	2225±115	Agrawal, 1965a, 42-43
,	TF. 14	Trench SE, A1, Stratum not given, Depth 2.06-3.02 m.	Neolithic	2025±350	,,

(**Southern Neolithic**)

NAGARJUNI-KONDA	TE. 63b	Grave-5, Skeleton No. 7, Depth 35 cm.	Neolithic (ca. 2000 B. C.)	A. D. 145±105	Agrawal, 1964a, 40-42
,,	TF. 73	Grave-4, Skeleton No. 6, Depth 40 cm.	,,	A. D. 415±110	,,
,,	TF. 74	Grave 8. Skeleton No. 10, Depth 50 cm.	,,	5±100	,,
,,	TF. 72	Grave 6, Skeleton No. 8, Depth 52 cm.	,,	A. D. 380±100	,,
,,	TF. 30	Neolithic pit No. 44 Site 46, Sector NV, Trench A3.	,,	A. D. 370±100	,,

SITE	INDEX	LOCUS	ARCH. DATE	C¹⁴ DATE	REFERENCE
KODEKAL	TF. 748	Trench 2, Layer 4, Depth 2.3 m.	Neolithic	2460±105	TIFR Date List, 1968b, Dec.
UTNUR	TF. 168	Site I, Square D, Layer 5, Depth 0.75 m.	Early Neolithic (IIIA)	2040±115	Agrawal, 1964 b, 266-269
,,	TF. 167	Site I, Square E, Layer 7, Depth 1.40 m.	Early Neolithic (IIA)	2050±155	,,
,,	BM. 54*	Site I, Square B, Layer 11a	Early Neolithic (IB)	2300±155	Barker, 1960, 26; Agrawal, 1964b, 266-269

TERDAL	**TF. 684**	Trench 1, Layer 2 Depth 17-25 cm.	Neolithic (?)	1935±100	Agrawal, 1967, 566-568
,,	**TF. 613**	Trench 1, Layer 3, Depth 45-65 cm.	Neolithic (?)	1770±120	,,
TEKKALA-KOTA	**TF. 262**	TKT-I, Trench 9, Layer 1, Depth 25 cm.	Neolithic	1610±140	Agrawal, 1965c, 394
,,	**TF. 266**	TKT-II, Trench 2, Layer 2, Depth 0.18 m.	Neolithic	1780±105	,,
,,	**TF. 237**	TKT-I, Trench 1, Layer 4, Depth 1 m.	Neolithic	1615±105	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
TEKKALA-KOTA	TF. 239	TKT-I, Trench 1. Pit 4 SB layer 4, Depth-1.35 m.	Neolithic	1540±105	Agrawal, 1965 c, 394
SANGANA-KALLU	TF. 355	Trench S. Rao's II, Layer 2, Depth 1.40 m.	Neolithic	1585±105	Agrawal, 1966c, 585-586
,,	TF. 354	Trench 1-2, Layer 3, Depth 2.5 m.	Neolithic (Early Level)	1590±110	,,
,,	TF. 359	Trench 1-2, Layer 4, Depth 2.4 m.	Neolithic (Early Level)	1550±105	,,
PALVOY	TF. 701	Layer 9, Depth 3.5 m.	Neolithic	1965±105	TIFR Date List, 1968a, June

HALLUR	TF. 570	Trench 1, Layer 4, Depth 1.80-2.10 m.	Megalithic-Neolithic, Overlap phase	1105±105	Agrawal, 1966c, 585-586
, ,	TF. 573	Trench 1, Layer 5, Depth 2.35-3.35 m.	, ,	955±100	, ,
, ,	TF. 575	Trench 1, Layer 7, Depth 3.2 m.	Late Neolithic	1030±105	, ,
, ,	TF. 586	Trench 2, Pit SB Layer 8, Depth 2.8 m.	Neolithic (Phase II B)	1195±100	TIFR Date List, 1967b, Dec.
, ,	TF. 580	Trench 1, Layer 14, Depth 6-1-6.4 m.	Early Neolithic	1710±105	TIFR Date List, 1966c, Aug.
T. NARSIPUR	TF. 412	TN. 24A, A-B, Layer-6, Depth 1.6 m.	Neolithic	1805±110	Agrawal, 1966c, 585-586

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
T. NARSIPUR	TF. 4 3	TN 24 A, C-D, Pit IV Sealed by layer 6, Depth 1.77 m.	Neolithic	1495±110	Agrawal, 1966c, 585-586
BAINAPALLI	TF. 349	Trench B.N.P-1, Layer 6, Depth 1.80 m.	Neolithic	1485±100	,,
			(Eastern Neolithic)		
CHIRAND	TF 1029	Trench CRD-XI, Layer 10, Depth 6.5 m.	Chalcolithic- Neolithic (Overlap phase)	1050±90	TIFR Date List, 1971a, March
,,	TF. 1028	Trench CRD-XI Layer 10, Depth 6.50 m.	,,	1540±90	TIFR Date List, 1971b, August
,,	TF. 1030	Trench CRD-XI, Layer 11, Depth 6.9 m.	Neolithic	1580±100	TIFR Date List, 1971a, March

CHIRAND	TF. 1031	Trench CRD-XI, Layer 12, Depth 7.2 m.	Neolithic	1675±140	TIFR Date List,1971a, March
,,	TF. 1032	Trench CRD-XI, Layer 13, Depth 7.5 m.	Neolithic	1755±155	,,
,,	TF. 1125	Trench CRD-XI, Layer 14, Depth 7.5 m.	Neolithic	1515±155	,,
,,	TF. 1033	Trench CRD-XI, Layer 14, Depth 8. 5 m.	Neolithic	1540±110	,,
,,	TF. 1126	Trench CRD-XI, Layer 15, Depth 8.1 m.	Neolithic	405±125	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
CHIRAND	TF. 1034	Trench CRD-XI. Layer 15, Depth 9 m.	Neolithic	1570 ± 115	TIFR Date List 1971a, March
,,	TF. 1036	Trench CRD-XI, Layer 17, Depth 10.1 m.	Neolithic	605 ± 125	,,
,,	TF. 1127	Trench CRD-XI, Layer 17, Depth 10.3 m.	Neolithic	1375 ± 100	,,
			PRE-HARAPPA CULTURE		
MUNDIGAK	GSY-53*	—	Period III-5	2360 ± 155	Allchin, 1968, 337

MUNDIGAK	GSY-51*	—	Period III-1	1135±113	Allchin, 1968, 337
,,	GSY-52*	—	Period II-1	1634±118	,,
,,	TF. 1132	—	Period II-1	2995±105	Agrawal, 1971
,,	GSY-50*	—	Period I-5	2113±155	Allchin, 1968, 337
,,	TF. 1131	—	Period I-5	2755±105	Agrawal, 1971
,,	TF. 1129	—	Period I-3	3145±110	,,
DAMB-SADAAT	UW-59*	Quetta Valley, No. Q8, Test Pit, AT, level 160	Period I	2510±70	Fairhall, 1966, 498; Agrawal, 1968b, Table 1
,,	L.180B*	Quetta Valley, in rubble fill	Period I	2320±360	Broecker, 1956 154; Dales, 1965, 276

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
NIAI BUTHI	P-478	S portion of W face of the site	Kulli association	1900±65	Stuckenrath, 1963, 82; Lal 1963, 212
AMRI	TF. 863	Layer 19, No. Ai. A	Period IC	2665±110	Agrawal, 1971
,,	TF. 864	Layer 28 c No. Ai, A10	Period IB	2900±115	,,
KOT DIJI	P-195	Citadel area, Square BIV/I, Layer 4	Period I (Late Level)	2090±140	Ralph, 1959. 51; Lal, 1963, 211
,,	P-180	Citadel area Square BIV/6, Layer 5	Period I (Mid Level)	2255±140	,,
,,	P-179	Lower city area, Square BV/7, Layer 5	,,	2335±155	,,

KOT DIJI	P-196	Citadel area, Square B iv/2, Layer 14	Period I (Early Level)	2605±145	Ralph, 1959, 51; Lal, 1963, 211
KALIBANGAN	TF.154	KLB-1, ZC 2, Layer 8, Depth 2.7 m.	Period I (Late Phase)	1820±115	Agrawal, 1968 a, 96; 1968 b, Fig. 5
,,	TF.156	KLB-1, XE-I, Qdt I, Layer 2,	Period I (Late Phase ?)	1900±110	,,
,,	TF.165	KLB-1, XD-I, Qdt. 1 & 2, Layer 2 R, Depth 2.35 m.	Period I (Late Phase)	1965±105	,,
,,	TF. 161	KLB-1, YF-2, Qdt. 2, Layer 3, Depth 1. 4 m.	Period I (Mid Phase)	2095±105	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
KALIBANGAN	TF.240	KLB 1, Locus XD 1, Pit 3 SB Layer 3, Depth 2. 50 m.	Period I (Early Phase)	1765±115	Agrawal, 1968 a, 96; 1968 b, Fig. 5
,,	TF. 162	KLB-1, Locus XE-1, Qdt. 2, Pit 1 SB Layer 3, Depth 1.85 m.	,,	2105±105	,,
,,	TF.241	KLB-1, Locus XD-1, Qdt. 1, Pit 4 SB Layer 2, Depth 2.75 m.	,,	2255±95	,,
,,	TF.157	KLB-1, Locus YF-2, Qdt. 3, Layer 5, Depth 1.2 m.	,,	2290±120	,,
,,	TF.155	KLB-1, Locus ZB 2, Layer 9 B, Depth 3.40 m.	,,	2370± 15	,,

HARAPPA CULTURE

DAMB SADAAT	UW-60	—	Period III	2140±165	Fairhall, 1966, 498
,,	P-523	Room A, Q-8, DS-II	Period II	2200±76	Stuckenrath, 1963,82; Dales, 1965,276
,,	L-180C	Room 2, Wall C, DS-II	,,	2425±412	Broecker, 1956,154; Dales, 1965,276
,,	L-180 E	Room 3, North wall, DS-II	,,	2425±361	,,
,,	P-522	Phase F, Sec. II, Cut. G-T, Q 8, DS-II	,,	2559±202	Stuckenrath, 1963,82; Dales, 1965,276

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
MOHENJO-DARO	TF.75	Chamber 60, Block-2, From the pavement of a 'Late date', Depth 1.27 m. below datum, Field No. L 855	Late Phase	1755±115	Agrawal, 1964 a, 40-42
,,	P-1182 A	Area VI, 9, Level 4	,,	1865±65	Stuckenrath, 1967,333
,,	P-1178A	Area VI, 9, Level 4	,,	1965±65	,,
,,	P-1180A	Area VI, 9, Level 4	,,	1995±65	,,
,,	P-1179	Area VI, 9, Level 4	,,	2085±65	,,

,,	P-1176	Area VII, 4, Level 4	,,	1965±60	,,
,,	P-1177A	rea VII, 3, Level 4 a	,,	2155±65	,,
KALIBANGAN	TF.143	Trench KLB-2, Locus YA-1, Qdt. 3, Layer 2, Depth 0.25 m.	Period II (Late Phase)	1665±110	Agrawal, 1968 a, 96; 1968 b, Fig. 5
,,	TF.244	Trench KLB-2, Locus E 2, Qdt. 4, Layer 2, Depth 0.35 m.	,,	1390±95	,,
,,	TF.138	Trench KLB-2, Locus A7, Qdt. 4, Layer 3, Depth 0.9 m.	,,	1215±105	,,
,,	TF.149	Trench KLB-2, Locus ZE1, Qdt. 4, Layer 3, Depth 0.65 m.	,,	1830±145	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
KALIBANGAN	**TF.150**	KLB-2, ZE 1, Qdt 4, Layer 6, Depth 1.35 m.	Period II (Late Phase)	1900 ± 105	Agrawal, 1964 b, 266-269;1968 b, Fig.5
,,	**TF.605**	KLB-1, ZB-9, Qdt 3, Layer 10, Depth 1. 6 m.	,,	1975 ± 110	Agrawal, 1968 a, 96; 1968 b, Fig. 5
,,	P-481	KLB 2, Layer 3, 1 m. deep	,,	2050 ± 75	Stuckenrath, 1963, 82
,,	**TF.153**	KLB-2, Locus XB 7, Qdt. 2, Hearth SB Layer 1, Depth 0.25 m.	,,	2075 ± 110	Agrawal, 1968 a, 96; 1968 b, Fig. 5
,,	**TF.25**	KLB-2, Square F, Depth 0.27 m.	,,	2090 ± 115	Kusumgar, 1963, 147; Agrawal, 1968 b, Fig.5

KALIBANGAN	TF.152	KLB-2, Locus XB 9, Qdt. 4, Layer 5, Depth 0.95 m.	Period II (Mid Phase)	1770±90	Agrawal, 1968 a, 96; 1968 b, Fig. 5
,,	TF.142	KLB-2, Locus XB 8, Qdt. 4, Layer 4, Deptn 1.15 m.	,,	1790±105	,,
,,	TF.141	KLB-2, Locus A 7, Qdt. 3, Layer 7, Depth 1.64 m.	,,	1860±115	,,
,,	TF.139	KLB-2, XA 8, Qdt. 2, Layer 6, Depth 0.95 m.	,,	1930±105	Agrawal, 1964 b, 266-269; 1968 b, Fig. 5
,,	TF.151	KLB-2, E 1, Qdt. 1, Layer 17, Depth 3.10 m.	,,	1960±105	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
KALIBANGAN	TF.145	KLB-2, XA 8, Qdt. 3, Layer 14, Depth 2.25 m.	Period II (Lower Mid Phase)	2060 ± 105	Agrawal, 1964 b, 266-269; 1968 b, Fig-5
,,	TF.147	KLB-2, E 1, Qdt. 1, Layer 23, Depth 5.00 m.	,,	2030 ± 105	,,
,,	TF.608	KLB-2, A-6, Qdt. 2, Layer 18, Depth 4.50 m.	Period II (Early Phase)	2075 ± 110	Agrawal, 1968 a, 96; 1968 b, Fig. 5
,,	TF.163	KLB-1, YE 1, Qdt. 4, Layer 2 R, Depth 0.47 m.	,,	2080 ± 105	,,
,,	TF.607	KLB-2, A-8, Qdt. 2, Layer 18, Depth 4.10 m.	,,	2090 ± 125	,,

,,	TF.160	KLB-1, XC 1, Qdt. 2, Layer 12, Depth 3.65 m.	,,	2230±105	Agrawal, 1965 b, 291; 1968 b, Fig. 5
LOTHAL	TF.19	SRG-11, 5B, Depth 2.19 2.25 m.	Period B or II Early Level, (Phase V)	1800±140	Kusumgar, 1963,141; Agrawal, 1968 b, Table 1
,,	TF.23	SRG-54, XLIII-XLVIII/4, Depth 1.22	,,	1865±110	,,
,,	TF.29	SRG-55, XII-XVIII/7, Depth 2.11 m.	Period A or I Early Level, (Phase IV)	1895±115	,,
,,	TF.26	SRG-2, D 13/7 A, Depth 1.98-2.26 m.	Period A or I Late Level, (Phase III)	2000±25	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
LOTHAL	TF.27	SRG-2, D-13/7 A, Depth 1.98 m.	Period A or I Late Level, (Phase III)	2000±115	Kusumgar, 1963, 141; Agrawal, 1963 b, Table 1
,,	TF.22	SRG-2, E-13/9, Depth 1.88 m.	,,	2010±115	,,
,,	TF.133	SRG-2, AX 33, Layer 6, Depth 1.37 m.	Period A or I Late Level, (Phase II)	1895±115	Agrawal, 1964 b, 266-269
,,	TF.135	SRG-2, AX 33, Layer 9, Depth 2.5 m.	Period A or I Early Level, (Phase II)	1555±130	,,
,,	TF,136	SRG-2, AX 33, Layer 10, Depth 3.0 m.	Period A or I Late Level (Phase I)	2080±135	,,

ROJDI	TF.200	B/5, VII-IX, Layer 3, Depth 65 cm.	Period I (Phase B)	1970 ± 115	Agrawal, 1964 b, 266-269
,,	TF.199	Trench C, Pit 2 Sealed by Layer 4, Depth 1.75 m.	,,	1745 ± 105	,,

OTHER CHALCOLITHIC CULTURES

(Banas Culture)

AHAR	TF.31	Trench X, Layer 5, Depth 1.98 m.	Phase IC (Late Level)	1270 ± 110	Kusumgar, 1963, 145-146; Agrawal, 1968 b, Table 3
,,	TF.32	Trench A, Layer 5, Depth 4.9 m.	Phase IC (Mid Level)	1550 ± 110	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
AHAR	TF.34	Trench E, Layer 7, Depth 11.5 m.	Phase IA (Mid Level)	1725 ± 140	Kusumgar, 1963, 145-146; Agrawal, 1968 b, Table 3
,,	TF.37	Trench J, Layer 8, Depth 12.1 m.	,,	1305 ± 115	,,
,,	V-57	Trench H, Layer 7, Depth 37 ft.	Phase IA	2145 ± 100	Bermingham, 1966, 507; Agrawal, 1968 b, Table 3
,,	V-56	Trench Y, Layer 8, Depth 37 ft.	,,	1875 ± 100	,,
,,	V-54	Trench Z, Layer 9, Depth 37 ft.	,,	2000 ± 100	,,

,,	V-58	Trench J, Layer 10, Depth 41 ft.	,,	2055 ± 105	,,
,,	V-55	Trench-K, Layer 11, Depth 41.5 ft.	,,	1990 ± 125	,,
			(Malwa Culture)		
ERAN	P-525	ERN-2 C, Layer 15, Depth 5.23 m.	Period I (Late Level)	1340 ± 70	Stuokenıath, 1963, 82; Thapar, 1964-65, 158-59
,,	TF.327	ERN 7, VI-IX, Layer 17, Depth 6.8 m.	,,	1425 ± 105	TIFR Date List, 1966 b, August
,,	P-526	ERN-7, XIII-XVI Layer 18 C, Depth 6.01-6.27 m.	,,	1280 ± 70	Stuokenrath, 1963, 82; Thapar, 1964-65, 158-59

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
ERAN	P-527	ERN 7, XIII-XIV Layer 19, Depth 6.78-6.88 m.	Period I (Late Level)	640±60	Stuckenrath, 1963, 82; Thapar, 1964-65, 158-59
,,	TF.329	ERN-7, VI-IX, Layer 19, Depth 7.5 m.	,,	1445±110	TIFR Date List, 1966 b, August
,,	P-528	ERN-7, XVII-XIV, Layer 20, Depth 7.31-7.51 m.	Period I (Mid Level)	1015±65	Stuckenrath, 1963,82; Thapar, 1964-65, 158-59
,,	TF.330	ERN-7, IV-IX, Layer 20, Depth 7.65 m.	,,	1365±100	TIFR Date List 1966 a, May

,,	TF.331	ERN-7, IV-IX, Layer 21, Depth 8.0 m.	Period I (Mid Level ?)	1500±95	TIFR Date List, 1966 b, August
,,	P-529	Exten. B, Layer 4, Depth 3.70-3.75 m.	Period I (Early Level)	2035±75	Stuckenrath, 1963, 82;
KAYATHA	TF.396	KTH-1, Layer 32, Depth 7.8 m.	Chalcolithic, yielded Malwa-Jorwe ware	1730±110	Agrawal, 1969 a, 4-6; TIFR Date List, 1967 a, July
,,	TF.397	KTH-1, Layer 33, Depth 8 m.	,,	1500±100	,,
,,	TF.402	KTH-1, Layer 35, Depth not given	,,	1380±100	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
KAYATHA	TF.398	KTH-1, Layer 35, Depth 8·5m.	Chalcolithic, yielded Malwa-Jorwe ware	1675±100	TIFR Date List, 1967 a, July
NAVDATOLI	P.205	Trench I, Sub-sq.M, Layer 2, Depth ?	Phase IV (Early Level)	1445±130	Ralph, 1959, 45; Thapar, 1964-65, 154-55
,,	P.204	Trench I, Sub-sq. G, Layer 3, Depth ?	Phase III (Late Level)	1600±130	,,
,,	P.202	Trench I, Sub-Sq. A-18, Layer 6, Depth ?	Phase II (Late Level)	1660±130	,,

,,	P.—476	Trench I, Sub-Sq. A 17, Layer 7, Depth 1.27m.	Phase II (Mid Level)	2300±70	Stuckenrath 1963,82; Thapar, 1964-65, 154-55
,,	TF.59	Trench I, Sub-Sq. A-1 Layer 9, Depth 2. 75m.	Phase I (Late level)	1525±110	Kusumgar,1963 149 Thapar, 1964-65, 154-55
,,	P-200	Trench II, Sub. Sq. W, Layer 8, Depth ?	Phase I (Early Level)	1610±130	Ralph, 1959, 45; Thapar, 1964-65, 154-55
,,	P-475	Near 'S' Section, Layer ? Depth 2.03 m.	Earliest Floor Phase I	1610±70	Stuckenrath, 1963, 82; Thapar, 1964-65, 154-55

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
NAVDATOLI	P-201	Trench II, Sub. Sq. D, Layer 8, Depth ?	Phase I (Early Level)	1645±130	Ralph, 1959, 45; Thapar, 1964-65, 154 55
			(Jorwe Culture)		
SONEGAON	TF.379	Trench MD. II. Layer 2 b, Depth 1.5 m.	Jorwe Culture Deposit	1290±95	Agrawal, 1969 a, 4-6; TIFR Date List, 1966 b, Aug.
,,	TF.380	Trench MD-II, Layer 4, Depth 1.8 m.	,,	1375±110	,,
,,	TF.382	Trench MD-II, Layer 5, Depth 2.0 m.	,,	1340±100	Agrawal, 1969 a, 4-6; TIFR Date List, 1966, Oct.
,,	TF.384	Trench MD II, Layer 7, Depth 2.36 m.	,,	1565±110	,,

,,	TF.383	Corner of Baulk, Layer-(?) Depth 4.3 m.	,,	1330±100	,,
NEVASA	TF.40	Trench No. 181, Layer 5. Depth 1.34 m.	Period III (Late Level)	1250±110	Kusumgar, 1963,150;
,,	P-184	Trench F, MD-I, Floor SB Layer 10, Depth 6.70 m.	,,	670±120	Ralph, 1959, 45; Thapar, 1964-65, 155
,,	P-181	Trench H, MD-1, Layer 11, Depth 6.90 m.	,,	1250±125	,,
CHANDOLI	TF.42	Trench 2, Layer 2, Depth 0.5 m.	Period I (Early Level)	1170±120	Kusumgar, 1963, 146-47; Thapar, 1964-65; 157

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
CHANDOLI	P-474	Trench 9, Layer 2, Depth 0.76 m.	Period I Early Level	1240±190	Stuckenrath, 1963, 82; Thapar, 1964-65, 157
,,	P-473	Trench 7, Layer 2, Depth 0.83 m.	,,	1330±70	,,
,,	TF.43	Trench 7, Layer 2, Depth 0.86 m	,,	1040±105	Kusumgar, 1963, 146-47; Thapar, 1964-65, 157
,,	P-472	Trench 8, Layer 2, Depth 0.88 m.	,,	1300±70	Stuckenrath, 1963, 82; Thapar, 1964-65, 157
			(Eastern Chalcolithic Culture)		
CHIRAND	TF.444	CRD-VII, A-2, Layer 16, Depth 10.5 m.	Chalcolithic	715±105	Agrawal, 1969 a, 4-6

,,	TF.334	CRD-VII B Layer 18, Depth 12.5 m.	,,	845±125	Agrawal, 1966 a, 4-5
,,	TF.445	CRD-X, A-2 Pit in natural Soil sealed by Layer 11, Depth 8.2 m.	,,	1650±100	Agrawal, 1969 a, 4-6
MAHISDAL	TF.390	Trench MDL-1, Layer 4, Depth 1.45 m.	Chalcolithic (Late Phase)	855±100	,,
,,	TF.392	Trench MDL-1, Layer 5, Depth 1.30 m.	Chalcolithic	1085±110	,,
,,	TF.391	Trench MDL-1, Pit 3 SB Layer 5, Depth 1.61 m.	,,	1380±105	,,

MEGALITHIC CULTURE

(Northern Megalithic)

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
KOTIA	TF.318	Meg. I, Depth 0.15-0.3 m.	Megalithic (Iron Age)	A.D.1725±100	TIFR Date List, 1966 a, May
,,	TF.319	Meg. II, Depth 0.1-0.55 m	,,	250±105	,,
,,	TF.320	Meg. IV Depth 0.1-0.6 m.	,,	A.D.1460±100	TIFR Date List, 1966 b, August
,,	TF.321	Meg. V Depth 0.25-0.35 m.	,,	A.D.955±100	,,
,,	TF.322	Meg. VA Depth 0.15-0.25 m.	,,	A.D.1365±100	,,
KAKORIA	TF.179	KKR IA, 0-III, Pit E SB Layer 1, Depth 0.7 m.	Chalcolithic-Megalithic	A.D.1750±95	Agrawal, 1966 a, 4-5

,,	TF.183	KKR II, Layer 4, Depth 0.76 m.	,,	A.D.1745±100	Agrawal, 1965 a, 42-43
		(Southern Megalithic)			
HALINGALI	TF.685	Meg. III, Depth 0.130-0.150 m,	Megalithic	80±100	TIFR Date List, 1967 b, Dec.
HALLUR	TF.570	Trench 1, Layer 4, Depth 1.80-2.10 m.	Megalithic-Neolithic Overlap Phase	1105±105	Agrawal, 1966 c, 585-86
,,	TF.573	Trench 1, Layer 5, Depth 2.35-3.55 m.	,,	955±100	,,
BAINAPALLI-PAIYAMPALLI	TF.350	BNP-1, C 1, Pit 4 SB Layer 3, Depth 1.30 m.	Post-Megalithic	380±105	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
BAINAPALLI-PAIYAMPALLI	TF.828	—	Megalithic	210±100	—
,,	TF.823	—	,,	640±105	—
T.NARSIPUR	TF.414	T.N. 24 A, C-D, Layer 3 A, Depth 0.67 m.	,,	A.D.1725±90	Agrawal, 1966 c, 585-86
			(P. G. WARE CULTURE)		
NOH*	UCL-703 A	—	Mid Phase (?), P.G. Ware Deposit	605±260	Agrawal, 1968 b, Table 4
,,	UCL-703 B	—	,,	820±225	,,
HASTINAPUR	TF.83	HST-1/1962, Layer 26 and Pit Y SB 25, Depth 6.25 m.	End of P.G. Ware, (Uppermost Layer, Period II, c.800BC.)	335±110	Agrawal, 1964 a, 40-42

N. B. TF. 828 and TF. 823 are quoted from the paper *Radiocarbon Chronology in Indian Prehistoric Archaeology* **(D.P. Agrawal** *et alia***), submitted to the** *Jour. of the Asiatic Soc. of Bombay.*

,,	TF.112	HST-1/1962, Layer 26 and Pit Y SB 25, Depth 6.8 m.	,,	375±100	Agrawal, 1964 b, 266-69
,,	TF.90	HST-1/1962, Layer 26, Depth 6.6 m	,,	385±110	Agrawal, 1964 a, 40-42
,,	TF.91	HST-1/1962 Layer 27, Depth 6.9 m.	Late Level, Period II	570±125	Agrawal, 1964 b, 266-69
,,	TF.85	HST-1/1962, Layer 28 & Pit Z SB 27, Depth 7.25 m. to 7.45 m. BS	,,	505±130	Agrawal, 1964 a, 40-42
ALAMGIRPUR	TF.51	—	P.G. Ware Deposit	A.D. 860±100	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
AHICHCHHATRA	TF.317	High Mound, X-XI, Layer 15, Depth 3.4 m.	Late phase, P.G. Ware Deposit	270±105	Agrawal, 1966 b, 276-78
ATRANJIKHERA	TF.287	ARJ-4,E 2 (NW), Layer IY, Depth 1.34 m.	P.G. Ware Deposit (?)	A.D 300±100	TIFR Date List, 1968 a, June
,,	TF.291	ARJ-4, DI (SE), Layer 6, Depth 2.50 m.	Late Level, P.G. Ware Deposit	535±100	Agrawal, 1966 a, 4-5
,,	TF.191	ARJ-4, DI (SW), Layer 6, Depth 3.20 m.	Mid Level, P.G. Ware Deposit	1025±110	Agrawal, 1964 b, 265-69
TILAURAKOT	TF.737	A 2-A 3, Layer 10, Depth 2.58 m.	P.G. Ware Deposit	350±95	Agrawal 1968 b, Table 4.

(N. B. P. WARE CULTURE)

HASTINAPUR	TF.81	HST-1/1962, Layer 18, Depth 5.1 m	Period III, Uppermost Layer, (c. 300 B. C.)	125±100	Agrawal, 1964 b, 266-69
„	TF.80+82	HST-1/1962 (North Ext.) Layer 23, Depth 3.9 m.	End of Period III, (c. 300 B.C)	50±100	Agrawal, 1964 a, 40-42
„	TF.88	HST-1/1962, Layer 25, Depth 6.45 m.	Period III, Lowest Layer (c. 600 B.C.)	340±110	„
AHICHCHHA-TRA	TF.310	High Mound, XI-XII, Pit 4 SB Layer 8 A, Depth 2.5 m.	N.B.P. Ware Deposit	160±95	Agrawal, 1966 a, 4-5
,	TF.311	High Mound, IX-X, Pit 5 SB Layer 14, Depth 3.8 m.	N.B.P. Ware Deposit, also yield P.G. Ware	475±105	„

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
ATRANJI-KHERA	TF.195	ARJ-4, Layer 14, Depth 2.15 m.	N.B.P. Ware Deposit	A.D. 50±100	TIFR Date List, 1966 a, Oct.
,,	TF.194	ARJ-4, AI (NW), Layer 16, Depth 3.1 m.	,,	530±85	Agrawal, 1966 a, 4-5
,,	TF.283	ARJ-4, AI (NE), Layer 27, Depth 4.85 m.	,,	260±105	,,
,,	TF.284	ARJ-4, AI (SW), Layer 29 Depth 5 m.	,,	295±100	,,
KAUSAMBI	TF.100	KSB-G/R-YZ 2, 1-2, Pit A SB Layer 18 A BK, Depth 2.15 m.	Mid Level of the Late Phase, N.B.P. Ware Deposit	275±100	Agrawal, 1964 b, 266-69

,,	TF.103	KSB-G/R-YZ 2, 2-3, Pit C SB Layer 18 A BK, Depth 3 m.	,,	410±110	Agrawal, 1965 a, 42-43
,,	TF.105	KSB-G/R-YZ 2, 1-2, Pit A SB Layer 21 BK, Depth 2.4 m.	Late Level of the Mid Phase N.B.P. Ware Deposit	335±115	,,
,,	TF.104	KSB-G/R-YZ 2, 2-3, Layer 22 BK, Depth 2.4 m.	,,	270±110	,,
,,	TF.225	KSB-G/R-YZ 3, 1-2, Layer 11, Depth 1.6 m.	Mid Level of the Mid Phase, N.B.P. Ware Deposit (c. 325 B.C.)	400±110	Agrawal, 1965 c, 394
,,	TF.226	KSB-G/R-YZ 3, 1-2, Layer 12, Depth 0.3 m,	,,	220±100	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
KAUSAMBI	TF.219	KSB I-III-RD, 2-7, Road I, Depth 3 m,	Mid Level of the Mid Phase, N.B.P. Ware Deposit, (c. 350-275 B.C.)	440±100	Agrawal, 1965 c, 394
,,	TF.221	KSB I-III-RD, 5-7, Pit B SB Layer 12, Depth 4.3 m,	Early Level of the Mid Phase, N.B.P. Ware Deposit (c. 400-350 B.C.)	500±105	,,
RAJGHAT	TF.293	RGT-XI, XI-XII, Layer 11, Depth 9.45 m.	Early Phase, N B.P. Ware Deposit	490±110	Agrawal, 1966 a, 4-5
HETIMPUR	TF.176	HPR-I, A 2, IX-XIV, Layer 4, Depth 0.46 m,	N.B.P. Ware Deposit	105±105	Agrawal, 1965 a, 42-43

"	TF.177	HPR-I, A 2, XII-XIII, Pit B SB Layer 4, Depth 1.2 m.	N.B.P. Ware Deposit	A.D. 80±105	"
CHIRAND	TF.446	Trench CRD-IC, Layer-6, Depth 3.25 m.	Top of N.B.P. Ware Deposit	35±105	Agrawal, 1969 b, 259-60
RAJGIR	TF.45	Layer 4 below the mud rampart, Depth 7.05 m,	N.B.P. Ware Deposit (c, 600 B,C,)	265±105	Kusumgar, 1963, 151; Agrawal, 1968 b, Table 5
"	TF.46	Pit 3 out into Layer 5, Depth 8.7 m,	"	260±100	"
BESNAGAR	TF.387	BSN-4 Layer-8, Depth 3.5 m,	N.B.P. Ware Deposit	470±105	Agrawal, 1966 b, 276-78

SITE	INDEX	LOCUS	ARCH DATE	C^{14}DATE	REFERENCE
BESNAGAR	TF.254	BSN-1, Layer 8, Depth 2.70	Early Phase, N.B.P. Ware Deposit	295±110	Agrawal, 1965 o, 395
UJJAIN	TF.409	Locus IV-V, Layer 28, Depth 5.5 m.	N.B.P. Ware Deposit	450±95	Agrawal, 1969 b, 259-60
KAYATHA	TF.674	KTH-4, Layer 11, Depth not given	Early Historic Deposit, yield N.B.P. and P.G. Wares	470±100	TIFR Date List 1967 a, July
RUPAR	TF.213	RPR-1, Layer 26, Depth not given	N.B.P. Ware Deposit	390±105	Agrawal, 1966 a, 4-5
,,	TF.209	RPR-2, Layer 30, Depth 11.4 m.	Early Level, N.B.P. Ware Deposit	485±100	Agrawal 1965 c, 394

The Supplementary List

The supplementary list contains mostly those C^{14} dates which became available after the final processing of the data incorporated in the present work. Besides, it also includes those dates which could not profitably be discussed in the text as some of their essential details are not reported. They, however, do not affect our main conclusions as have been arrived here, saving the dates for the Kayatha culture which are likely to suggest some modificaation to the chronological frame of the "other Chalcolithic cultures."

In the absence of some necessary relevant informations the dates could not be arranged in relation to the corresponding stratigraphic sequence at the respective sites. They are being presented here in the same order as have been published by the concerned laboratory.

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
PALVOY	TF.700	—	Neolithic	1540±100	Agrawal, 1971
HALLUR	TF.576	Trench I, Layer 8, Depth 3.6 m.	,,	1425±110	TIFR Date List, 1968 a, June
BAINAPALLI-PAIYMPALLI	TF.833	—	,,	1360±210	Agrawal, 1971
,,	TF.827	—	,,	1725±110	,,
BARUDIH	TF.1101	Locus N-S 38 cms., E-W 59.5 cms. Depth 104-114 cms.	,,	595±90	TIFR Date List, 1971 b, Aug.
,,	TF.1102	Locus N-S 31.5-5.75 cms. E-W 62.0-98.5 cms. Depth 94.3 cms.	,,	660±90	,,

,,	TF.1099	Locus N-S 68 cms. E-W 44.5 cms.	,,	750±110	,,
,,	TF.1100	Locus N-S 29.5-56 cms., E-W 12.5-37.5 cms.	,,	1055±210	,,
NINDOWARI	TF-862	Trench ND, Layer 3, Depth not given	Kulli Culture	2065±110	Agrawal, 1972, 478-79
KALIBANGAN	TF.942	KLB-2, XAI-Qd.4, Layer 12, Depth 3.45 m.	Harappa Culture	2225±115	TIFR Date List, 1969, Dec.
,,	TF.946	KLB-2, ZN 1 Qd. 1, Layer 7, Depth 2.23 m.	,,	1765±105	,,
,,	TF.947	KLB-2, C 5, Qd. 3, Layer 34, Depth 5.20	,,	1925±90	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14} DATE	REFERENCE
KALIBANGAN	TF.948	KLB-2, C 5, Qd 3, Layer 22, Depth 3.10 m.	Harappa Culture	1980±100	TIFR Date List, 1969, Dec.
KAYATHA	TF.776	Trench A, Layer 4, Depth not given	Chalcolithic	1605±115	Agrawal, 1969 a, 4-6
	TF.777	Trench·A, Layer 5, Depth not given	,,	1780±100	,,
,,	TF.778	Trench A, Layer 6, Depth not given	,,	1705±95	,,
,,	TF.779	Trench A, Layer 7, Depth not given	,,	1840±110	,,

KAYATHA	TF.780	Trench A, Layer 8, Depth not given	,,	1835 ± 100	,,
,,	TF-781	Trench A, Layer 9, Depth not given	,,	1880 ± 105	,,
,,	TF.399	KTH-1 Layer 37, Depth 9.1 m.	,,	1675 ± 100	,,
,,	TF.401	KTH-1, Layer 39, Depth 10 m.	,,	1335 ± 105	,,
,,	TF.405	KTH-2, Layer 10, Depth 3.5 m.	,,	1465 ± 100	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
KAYATHA	TF.680	KTH-3, Layer 13, Depth not given	Chalcolithic	2015 ± 100	Agrawal, 1969 a, 4-6
,,	TF.678	KTH-4, Layer 18, Depth not given	,,	1685 ± 100	,,
,,	TF.676	KTH-4 Layer 14, Depth not given	,,	1305 ± 105	,,
,,	TF.679	KTH-3, Layer 9, Depth not given	,,	1300 ± 135	,,
,,	TF.974	KTH-B, Layer 19, Depth not given	,,	1635 ± 100	TIFR Date List, 1970, May

INAMGAON	TF.1000	INM-I, Tr. D 2, Layer 15, Depth not given	Period I	1375±85	Agrawal, 1972,478-79
,,	TF.1001	INM-I, Tr. AI-A 2, Layer 16, Depth not given	,,	1565±95	,,
,,	TF.924	From section scraping, Layer 2, Trench & Depth not given	Transitional Periods I & II	1370±200	,,
,,	TF.1087	INM-I, Tr. D 2, Layer 12, Depth not gven	Period II	1405±105	,,
,,	TF.1086	INM-I, Tr. D 1, Layer 8, Depth not given	,,	1535±155	,,

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
INAMGAON	TF.1085	INM-I, Tr. C 2, Layer 6, Depth not given	Period III	1440±110	Agrawal, 1972, 478-79
,,	TF.922	Mound I- Tr. C 3, Layer 5, Depth not given	,,	1345±100	,,
,,	TF.996	INM-I, Tr. A 2, Layer 4, Depth not given	,,	1070 ± 185	,,
,,	TF.923	Mound I, Tr. C 2, Layer 5, Depth not given	,,	1025 ± 170	,,
,,	TF.997	INM-I, Tr. D 2, Layer 7, Depth 2.8 m.	Chalcolithic	A.D. 375 ± 105	TIFR Date List, 1971 a, March

,,	TF.995	INM-I, Tr. A 2, Layer 3,	Chalcolithic (?)	A.D.125±125	,,
MALVAN	TF.1084	MVN IC, Layer 3 A, Depth 1 m.	Chalcolithic (Period 1)	800±95	Agrawal, 1972, 478-79
ATRANJI-KHERA	TF.289	ARJ-4, E 1 (SW), Layer 4, Depth 0.95 m.	Black-& Red Ware Deposit	675±110	TIFR Date List, 1968 a, June
,,	TF.415	From baulk, Trench E 1-E 2, Layer 8, Depth 0.5 m.	,,	570±210	,,
RAJGHAT	TF.292	RGT Cutting-B, Layer 6, Depth 5.9 m.	Black-slipped Ware Deposit	470±100	Agrawal, 1966 a, 4-5

SITE	INDEX	LOCUS	ARCH. DATE	C^{14}DATE	REFERENCE
SONPUR	TF.376	Trench (?) Pit. SB Layer 9, Depth 4.5 m.	Pre-N.B P. Ware Deposit	635 ± 110	TIFR Date List, 1966, March
CHIRAND	TF.336	CRD-VII B, Layer 14, Depth 8.5 m.	Black & Red Ware Deposit (Period IB)	765 ± 100	Agrawal, 1966 a, 4-5
UJJAIN	TF.407	UJN-17, Layer 23, Depth 4.4 m.	Black-&-Red Ware Deposit (?)	100 ± 100	Agrawal, 1969 b, 259-60
ERAN	TF.326	ERN-7, Layer 16, Depth 8.2 m.	Period II a Immediately following the Chalcolithic Period	1040 ± 110	TIFR Date List, 1966 b, Aug.
,,	TF.324	ERN-7, Layer 14, Depth 5.6 m.	,,	1270 ± 110	,,

NOH	TF.993	Trench G, Layer 20, Depth 6.9 m.	P.G. Ware Deposit	725 ± 150	TIFR, Dote List, 1971 b, Aug
,,	TF.1144	From a "Stratified Level"	,,	490 ± 90	,,
,,	TF.994	Trench G, Layer 14, Depth 4.7 m.	N.B.P. Ware Deposit	685 ± 105	,,

Appendix A

PRE-HARAPPA CULTURES

Among the sites of the cultures of the pre-Harappan sphere the following six provide C^{14} dates—Mundigak, Damb Sadaat Niai Buthi, Amri, Kot Diji and Kalibangan. We will examine the relevant dates site-wise, and the bearing of the combined results on the chronology of the cultures in question will be discussed under the caption 'discussion'.

Mundigak

The site is situated in the southern Afghanistan. Period III, at the site, has cultural tie with the pre-Harappan levels at Damb Sadaat, Amri, Kot Diji and perhaps also with Kalibangan.

Two C^{14} dates are available for Period III, GSY-53 and GSY-51 (Allchin, 1968, 337). The first belongs to Period III-5 and the second one to Phase III-1. The determinations read 2360±115 B. C. for GSY-53, and 1135±118 B. C. for GSY-51. Besides these two, there are five more dates at our disposal, GSY-52 (Allchin, 1968, 337), TF. 1132 (Agrawal, 1971), GSY-50 (Allchin, 1968, 337), TF. 1131 and TF. 1129 (Agrawal, 1971). The first two belong to Period II-1, the next two [to Period I-5, and the last one to Period I-3. In order to investigate the behaviour of dates in larger stratigraphic profile we will consider here the above five as well along with the dates for Period III. GSY-51 and GSY-52 are obviously too young to date the Periods III-1 and II-1, hence they may safely be excluded.

TABLE A

Carbon-14 Dates and Corresponding Archaeological Sequence

Index	Arch. Sequence	C^{14} Date in B.C.
GSY-53	Period III-5	2360±115
TF. 1132	Period II-1	2995±105
GSY-50	Period I-5	2113±155
TF. 1131	Period I-5	2755±105
TF. 1129	Period I-3	3145±110

Saving TF. 1132 and GSY-50 which appear to be cases of divergent, the rest three are fully consistent with the corresponding archaeological sequence. The difference of any two of the consistent dates is also 'real' with the maximum level of confidence. On the basis of the consistent dates Periods III-5, I-5, and I-3 can be dated to c. 2350 B.C., c. 2750 B.C. and c. 3150 B.C. respectively. Considering the trend of dates Period II may be placed around 2600 B.C.

Damb Sadaat

The cultural assemblage of Damb Sadaat I, situated in North Baluchistan, has a strong relationship to that of Amri in Sind. We have two C^{14} dates for Damb Sadaat I, UW-59 (Fairhall, 1966, 498; Agrawal, 1968 b, Table 1) and L-180 B (Broecker, 1956, 160; Dales, 1965, 276). The samples are derived from No. Q 8 test pit AT, level 160, and Rubble Fill respectively. The determinations read 2510±70 B.C. for UW-59, and 2528±361 B.C. for L-180 B.

In the absence of the relative stratigraphic sequence of these dates it is not possible to assess the exact position of their consistency. However, the measurements are almost of the same value. The mean of the two, within one standard deviation, reads about 2700 B.C.* In the light of the dates available for Damb Sadaat II (*supra*, p. 69), Period I can be dated from c. 2700 to 2500 B.C.

Niai Buthi

There is only one date from Niai Buthi, P-478 (Stuckenrath, 1963, 82; Agrawal, 1968 b, Table 1). Archaeologically, it belongs to the horizon associated with Kulli culture. The measurement reads 1900±65 B.C. As we have a single date, hence it is difficult to check the validity.

Amri

At Amri Period I is pre-Harappan, it has been sub-divided into four phases, IA, IB, IC and ID. Period II has been regarded as intermediate between the pre-Harappan and Harappan, it has also been sub-divided into two phases, IIA and IIB. Period III is Harappan at the site.

We have two C^{14} dates for Period I, TF. 863 and TF. 864 (Agrawal, 1971). They belong to the phases I C and IB respectively. The determinations read 2665±110 B.C. for TF. 863, and 2900±115 B.C. for TF. 864.

TABLE B

Carbon-14 Dates and Corresponding Archaeological Sequence

Index	Arch. Sequence	C^{14} Date in B.C.
TF. 863	Phase IC	2665±110
TF. 864	Phase IB	2900±115

Both the dates are fully consistent with the corresponding archaeological sequence. Phases IB and IC can safely be dated

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*On page 76 (*supra*) it has been stated that c. 2700 B. C. has been fixed on the basis of L-180 B (within one standard deviation). Actually it has been calculated on the mean of L-180 B & UW-59 (within one standard deviation). The earlier statement is regretted and may be rectified.

to c. 2900 B C. and c. 2700 B.C. respectively. In the light of these dates the beginning of the pre-Harappa culture earlier than *circa* 3,000 B. C. is well indicated at the site.

Kot Diji

The pre-Harappan occupation of Kot Diji is designated as Period I. Four dates are available for the Period, P-195, P-180, P-179 and P-196 (Ralph, 1959, 51). Archaeologically, the first belongs to the late level, the next two to the mid level, and the last one to the early level of Period I (Lal, 1963, 211). The determinations read 2090±140 B.C. for P-195, 2255±140 B.C. for P-180, 2335±155 B.C. for P-179, and 2605±145 B. C. for P-196.

TABLE C

Carbon-14 Dates and Corresponding Archaeological Sequence

Index	Arch. Sequence	C^{14} Date in B.C.
P-195	Late level, Period I	2090±140
P-180	Mid level, Period I	2255±140
P-179	Mid level, Period I	2335±155
P-196	Early level, Period I	2605±145

The dates are fairly consistent with the corresponding archaeological sequence, except a minor discrepancy in P-180 and P-179. On the whole the determinations are dependable. The upper limit of Period I can be dated to c. 2100 B. C, as the sample P-195 is reported to have belonged to "the topmost Kot Diji layer which was immediately overlain by a deposit containing mixed Kot Diji and Harappan material" (Lal- 1963, 211). We have no determination to date the bottommost stratum, however, it may be fixed somewhere around 2700 B. C. in the light of P-196 (2605±145).

Kalibangan

At Kalibangan the pre-Harappan occupation has been designated as Period I. For this deposit nine dates are available —TF. 154, 1820±115 B. C.; TF. 156, 1900±110 B. C.; TF. 165, 1965±105 B. C; TF. 161, 2095±105 B. C; TF. 162, 2105±105 B. C.; TF. 241, 2255±95 B. C.; TF. 157, 2290±120 B. C.; TF. 155, 2370±120 B. C.; and TF. 240, 1765±115 B. C. The first three dates belong to the late phase, the next one to the mid phase, and the last five to the early phase of Period I. The samples TF. 162 and TF. 240 may be excluded as they are reported to have derived from below the faulted strata (Agrawal, 1968b, 117-118). We have, thus, seven dates, three for the early, one for the mid and three for the late phases.

TABLE D

Carbon-14 Dates and Corresponding Archaeological Sequence

Index	Arch. Sequence	C^{14} Date in B. C.
TF. 154	Late Phase, Pericd I	1820±115
TF. 156	,,	1900±110
TF. 165	,,	1965±105
TF. 161	Mid Phase, Period I	2095±105
TF. 241	Early Pháse, Period I	2255±95
TF. 157	,,	2290±120
TF. 155	,,	2370±120

All the three dates for the late phase of the Period are consistent with the corresponding sequence, and on their basis the phase can be placed between c. 2000 to 1800 B. C. The three dates for the early phase are also fully consistent. It is obvious as TF. 155 belonging to the layer just above [the natural soil gives the oldest date, and the other two, TF. 157 and TF. 241, of the higher strata being comparatively young are also in consonance with TF. 155. A single date for the mid phase is also in agreement to the dates for the late and the early phases. In the light of these consistent dates the pre-Harappan occupation at the site can be dated from c. 2400 to 1800 B. C. But if we add one standard deviation error to the central date as suggested by Agrawal (1968 b, 117) the bracket for the deposit in question would read from c. 2500 to 1950 B.C. (TF. 155, 2370+120=2490; TF. 154, 1820+115=1935).

Discussion

The cultures of the pre-Harappan sphere have been a confused mass of data for long. Piggott made the first synthetic attempt to decipher the lump but with the discovery of Togau red ware in the southern Baluchistan his proposition of the red and the buff ware zones hardly seems judicious. The work done by Fairservis, Dales and others too, despite their best efforts, could not provide any firm anchor to the floating chronology of the early cultures of the Indo-Baluch borderland, as they also depended essentially on the cultural equation which is scarcely a reliable guide. In the recent years the availability of the C^{14} dates for some of the regions has made a good beginning in building an absolute chronology for the cultures.

The C^{14} dates which have been found dependable, although, not sufficient to contribute to any conclusive chronological framework yet are significant in other ways. They provide some strong evidence to re-assess the question of the temporal correlation of Mundigak III, Damb Sadaat I, Amri I, Kot Diji I and Kalibangan I as arrived at on the basis of cultural equation. Dales (1965) is inclined to put them, barring perhaps Kalibangan, in one frame. Fairservis (1967), excepting Damb Sadaat I which he has placed in different group, includes the above along with Kalibangan and Damb Sadaat II in one group and dates them from about 2500 B. C. to 2300-2200 B. C.

Allchin (1968) finds a general relationship between Damb Sadaat I-III and Mundigak II-III. He also notices a link between Amri IA-IB and Mundigak III. But as regards the relationship between Amri and Kot Diji, he thinks that the phases IA to IC of the former are certainly earlier than the beginning of the latter. About Kalibangan he observes that "on the whole the pottery of Fabric A (Kalibangan) is distinct, while that of Fabrics B, C, D and E is closer to that of Kot Diji and Amri......"

Saving some minor disagreement the cultural tie of Mundigak III, Damb Sadaat I, Amri I, Kot Diji I, and perhaps Kalibangan as well, is almost certain. But what about the temporal correlation ? Do they belong to the same age group ? A negative answer by the C^{14} evidence is hinted, as the date for Mundigak III-5 reads about 2400 B. C. whereas that for Damb Sadaat I measures around 2700 B. C Again, the date for Amri IB goes back to c. 2900 B. C. while those for Kot Diji I and Kalibangan I read about 2700 B. C. and 2500-2400 B C. respectively. These dates make it difficult to agree with the framework as based on cultural tie.

The varying dates also throw some light on the problems of the nature of the tie, and the direction of diffusion of those traits on which the tie is depended upon. The contact at different time planes of the dated levels of the above mentioned sites probably suggests diffusion rather than trade, as, for trade-contact contemporaneity is necessary. As regards the question of the direction of diffusion of some of the common traits and their origin which have been identified at Mundigak III, Damb Sadaat I, Amri I, Kot Diji I and Kalibangan I, the plotting of the dates for the corresponding levels in geographical order indicates that they appeared first at Amri and from there* gradually diffused to the north-western and the north-eastern sites, as the date for Amri is the oldest of all whereas the others tend to become younger at the either directions.

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*The earlier observation that they diffused from the Baluch-Indus region as mentioned on page 13 (*supra*) was based on the dates other than Amri. The C^{14} dates for Amri became available only recently. The previous observation may be rectified.

Appendix B

C^{14} DATES OF THE MESOLITHIC CULTURES

For the Indian Mesolithic cultures the C^{14} dates are available from the following five sites—Sarai Nahar Rai* (Lat. 25° 45′ N., Long. 81° 50′ E.), Lekhahiya (Lat. 24° 47′ 30″ N., Long. 82° 8′7″ E.), Bagor (Lat. 25° 21′ N., Long. 74° 23′ E.) Adamgarh (Lat. 22° 43′ N., Long. 77° 44′ E.), and Langhnaj (Lat. 23°27″ N., Long. 72° 32′ E). In all there are nine dates. Saving a few, the dates are fairly consistent and indicate a general span of the Mesolithic cultures ranging from c. 8000 to 1700 B. C. but it needs confirmation as mostly the bone samples have been measured which are not always dependable. The reported details of the dated samples are as below in Table XY.

TABLE XY

Site	Index & Material	Locus	C^{14} Date in B.C.	Reference
Sarai Nahar-Rai (U.P.)	TF. 1104 (Bones)	Layer 1, Depth 5 cms. Tr. C5, Qd-3	8395±110	TIFR Date List, 1971a, March
Lekhahiya (U.P.)	TF. 417 (Bones)	Layer 4, Depth 15 cms. Skeleton VI	1710±110	Agrawal, 1967, 566-68
,,	TF. 419 (Bones)	Layer 8, Depth 0.38 m. Skeleton No. XVII.	2410±115	TIFR Date, List, 1967b Dec.

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*The site has recently been excavated jointly by the Institute of Archaeology, Allahabad University and the State Department of Scienctific Research and Cultural Affairs U.P. under the direction of Prof. G. R. Sharma. It has brougt to light a number of extended burials and hearths associated with microliths.

TABLE XY (Contd.)

Bagor* (Rajasthan)	TF. 1007 (Charred bones)	Trench EI, Depth 99-110 cms.	3835±105	TIFR Date List, 1970, May; Misra 1970, 232
,,	TF. 786 (Charred bones)	Trench E IV, Depth 117-126 cms.	4480±200	,,
,,	TF. 1012 (Charred bones)	Trench G V, Depth 131-140 cms.	3285±90	,,
Adamgarh (M.P.)	TF. 116 (Bones)	ADG 2, Layer 3, Depth 1.90 m.	895±105	Agrawal, 1967, 566-68
,,	TF. 120 (Shells)	ADG-10, Layer 3, Depth 0.15-0.21 m.	5500±130	,,
Langhnaj Gujrat)	TF. 744 (Bones)	—	2040±110	TIFR Date List, 1967 b, Dec.

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*Two more C14 dates are available from Bagor TF. 1009, 2765±105B.C. and TF. 1005+TF. 1006, 2110±90 B.C. The former belongs to the level from which copper arrow-heads are reported and the latter to the level immediately above that of the copper arrow-heads (Misra, 1970, 232).

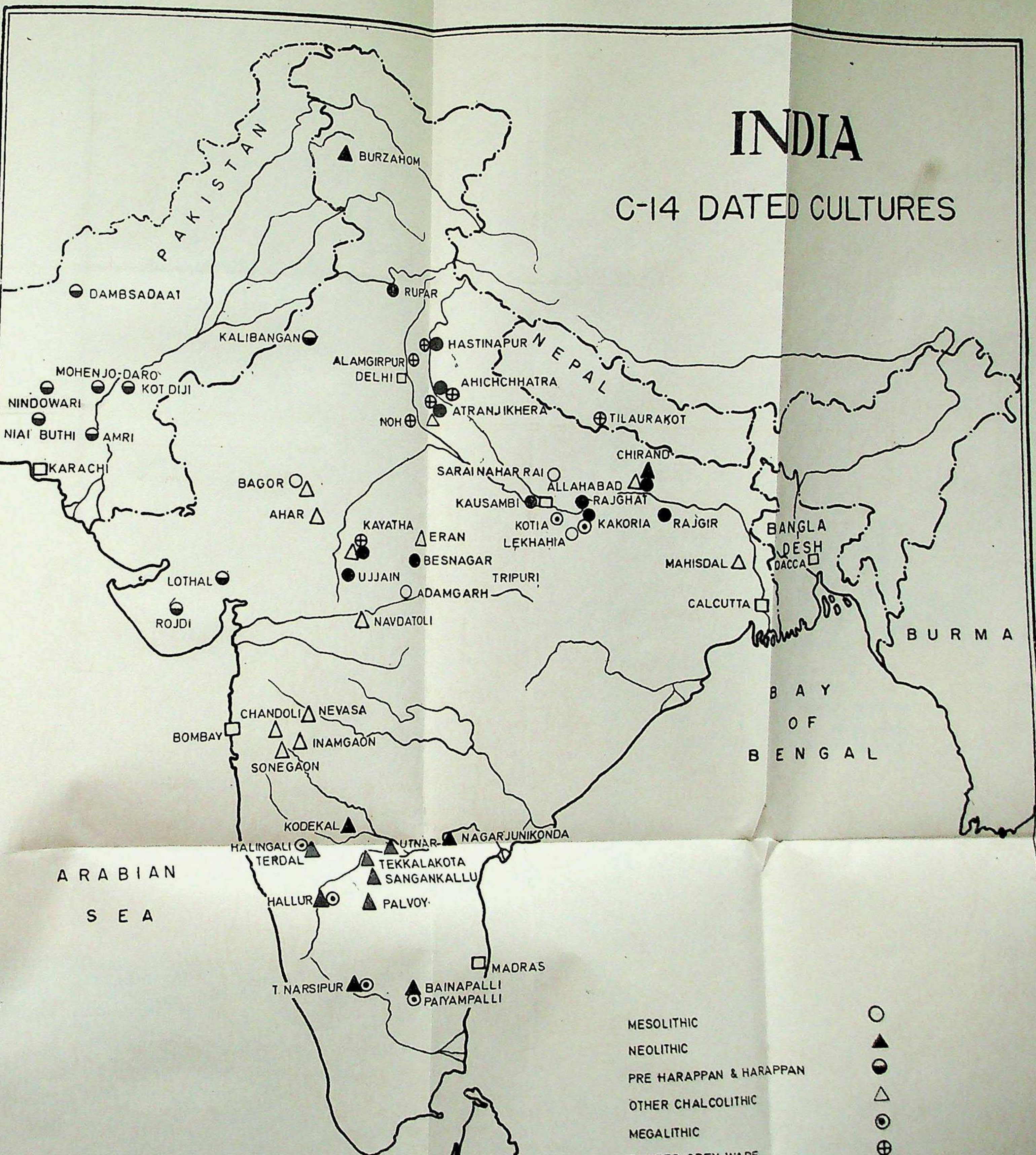
INDIA
C-14 DATED CULTURES
PAKISTAN
NEPAL
BANGLA DESH
BURMA
BAY OF BENGAL
ARABIAN SEA
BURZAHOM
DAMBSADAAT
RUPAR
KALIBANGAN
HASTINAPUR
ALAMGIRPUR
DELHI
AHICHCHHATRA
ATRANJIKHERA
NOH
TILAURAKOT
MOHENJO-DARO
KOT DIJI
NINDOWARI
NIAI BUTHI
AMRI
KARACHI
CHIRAND
SARAI NAHAR RAI
ALLAHABAD
BAGOR
RAJGHAT
KAUSAMBI
AHAR
KOTIA
KAKORIA
RAJGIR
LEKHAHIA
KAYATHA
ERAN
BESNAGAR
MAHISDAL
DACCA
UJJAIN
TRIPURI
LOTHAL
ADAMGARH
CALCUTTA
ROJDI
NAVDATOLI
CHANDOLI
NEVASA
BOMBAY
INAMGAON
SONEGAON
KODEKAL
HALINGALI
UTNAR
NAGARJUNIKONDA
TERDAL
TEKKALAKOTA
SANGANKALLU
HALLUR
PALVOY
MADRAS
T. NARSIPUR
BAINAPALLI
PAIYAMPALLI
MESOLITHIC ○
NEOLITHIC ▲
PRE HARAPPAN & HARAPPAN ◒
OTHER CHALCOLITHIC △
MEGALITHIC ⊙
PAINTED GREY WARE ⊕
NORTHERN BLACK POLISHED ●
KILOMETRES
100 50 0 100 200 300 400 500 600 700

Fig. 2

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Lucknow

Post Script

By the time our manuscript of the Banas culture was in the proof stage, a detailed report on the excavations at Ahar was published. It provides informations, both, about the correlation of the layers to which the dated samples, available for Ahar, belong to, as well as the sub-levels of the samples. Some of the essential archaeological data pertaining to the C-14 dates of Ahar which could not be furnished earlier (see p. 81, *supra*) are being supplemented herewith.

According to the correlation (Sankalia, 1969, Fig. B) TF.31 and TF. 32 derived from layer 5 of trench X and layer 5 of trench A correspond to the late and the mid levels of Phase I C respectively. The correlation also confirms that the sample TF. 37 collected from layer 8 of trench J belongs to a slightly earlier level than that of TF. 34 picked up from layer 7 of trench E. V-57, V-56, and V-54 derived from layers 7 of trench H, 8 of trench Y, and 9 of trench Z correspond to the top (?), the middle and the lower levels respectively of Phase IA. The layers 10 of trench J and 11 of trench K to which the remaining two samples V-58 and V-55 belong to have been correlated with the earliest layer of Phase IA at the site.